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ENGINEERING AND MINING JOURNAL-PRESS

A CONSOLIDATION OF ENGINEERING AND MINING JOURNAL AND MINING AND SCIENTIFIC PRESS

Kongsberg, Norway

A Three-Century-Old Silver Camp

By R. Stören

During their existence of three hundred years the mines and reduction plant of the Kongsberg Silver Works have produced over 1,100 tons of silver. A state-owned property since 1815, its operation has averaged an annual profit of about 200,000 crowns

A Trip to Peru

By Lucien Eaton

Trails are few and travel is difficult on the eastern slope of the Andes, in Puno Province, where professional work recently took the writer. Mining conditions as he saw them, and the difficulties he met, are described

Selective Flotation

at Bauer, Utah

By Edward Hodges Robie

Extremely fine grinding is necessary to separate the lead and zinc minerals at this interesting plant, flow sheets of which are given

The Magazine Explosion

at Jerome, Arizona

By W. V. De Camp

The New Tax Law—by Robert Murray Haig

Volume 121 March 6, 1926 *Number* 10

ENGINEERING AND MINING JOURNAL-PRESS

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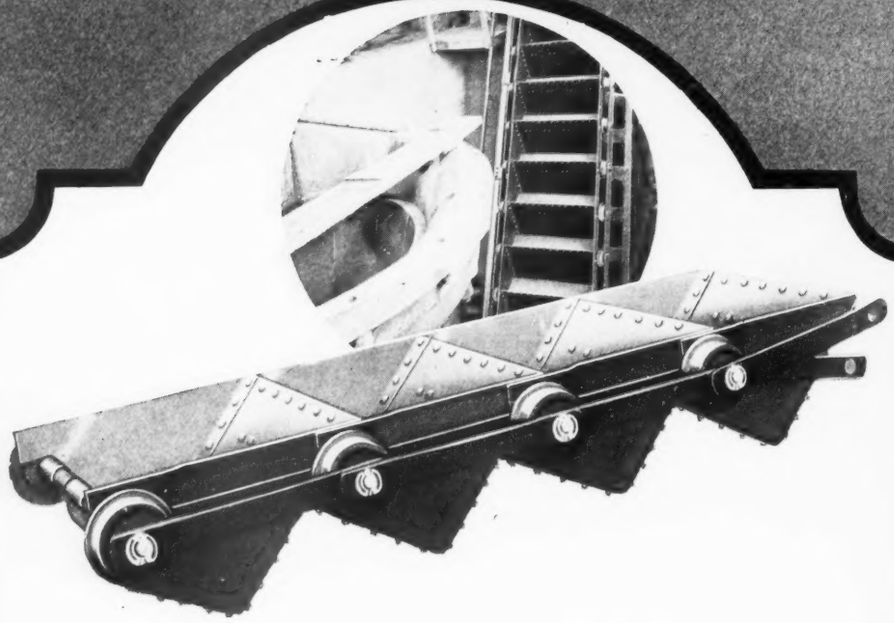

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ENGINEERING AND
MINING JOURNAL-PRESS

JOSIAH EDWARD SPURR, Editor

Volume 121 New York, March 6, 1926 *Number* 10

Discovery Depletion in the 1926 Tax Law

THE NEW TAX LAW revises the depletion clauses relating to discovery of mines and oil and gas wells. In the case of mines more liberality is shown in that discoveries shall include ore in commercial quantities contained in a vein or deposit discovered in an existing mine or mining tract if the vein or bed thus discovered is not merely an extension of a vein or bed already known to exist. In other words, a disconnected commercial orebody in a known mineralized zone is eligible for discovery valuation for depletion purposes, provided it has not been included in a former valuation.

In the amount of depletion allowable in the case of oil and gas wells the new tax law is definite. Discovery depletion as such is not mentioned, but the law specifically states that "In the case of oil and gas wells the allowance for depletion shall be 27½ per centum of the gross income from the property during the taxable year. Such allowance shall not exceed 50 per centum of the net income of the taxpayer (computed without allowance for depletion) from the property, except that in no case shall the depletion allowance be less than it would be if computed without reference to this paragraph."

The last clause in this provision means that the taxpayer may deplete upon cost where that basis is more favorable than it would be to take a depletion deduction of 27½ per cent of the gross income with 50 per cent of the net as a maximum. In its practical application the deduction of 27½ per cent of the gross income will be used in those cases where the search for oil has opened up new producing areas as distinguished from the purchase of proven areas, where in the usual case depletion will be based on cost.

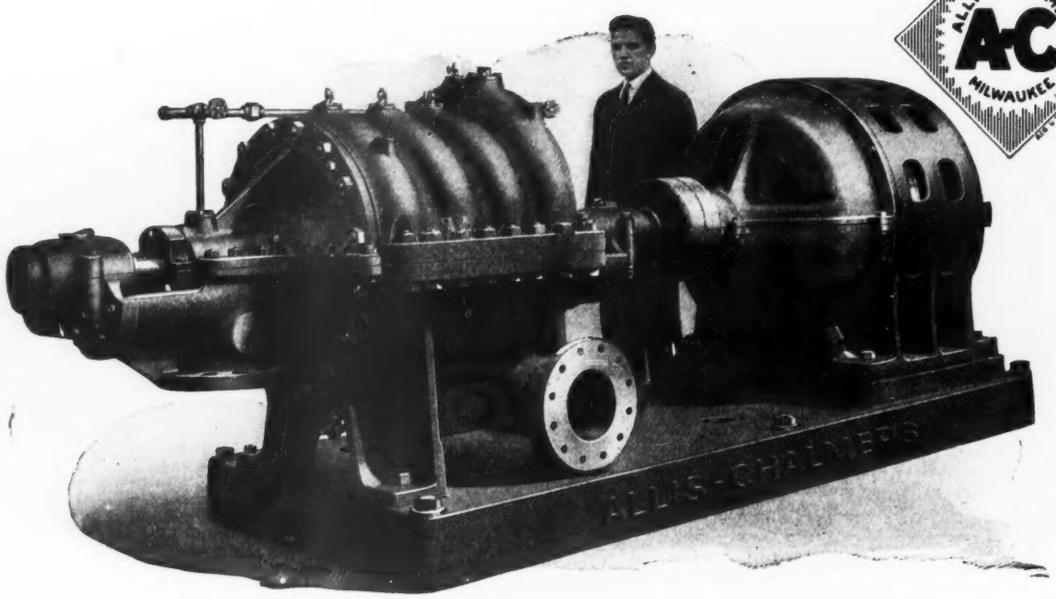
As between the discovery depletion allowable for mines, and the 27½ per cent deduction for oil wells, the oil industry has by far the greatest advantage, for the depletion deduction will cover an entire pool even more effectively than did the discovery clause in the earlier laws. The average percentage of discovery depletion for oil wells in 1921 to 1923 was approximately 30 per cent of gross income. There is therefore a slight reduction, but the rate is entirely too high, for it means that practically 50 per cent of the net income will be tax-free. The average depletion on cost is about 5 per cent of gross income, leaving 40 to 45 per cent of net income as development appreciation to be written off as depletion, after all exploration and production costs have been deducted.

While the 27½ per cent is excessive, Congress has adopted it, and there the responsibility rests. There is no room for bargaining as to how much depletion can be obtained by the taxpayer or allowed by the Revenue Bureau. It eliminates the personal equation of judgment in the many factors that enter into the analytical appraisal of the fugaceous oil in any specified area on the basis of one producing well in a 160-acre tract. It will not be necessary for the taxpayer to file extensive briefs, affidavits, vouchers, maps, or other data, to establish his depletion claims, nor will it be necessary for the Bureau in the future to determine a value for each tract upon which a discovery well is brought in. In the 1918 law the oil-well discovery clause provided that the well should be valued as, of, and within thirty days after discovery. The department was (and still is) so far behind with its work that it is common practice for taxpayers to set up five to ten years' actual production from all the wells on the lease or tract and reflect this back to the date of the discovery well as "information known at that time." This the Bureau usually accepts, resulting in excessive values and unreasonable depletion that wipes out taxable income. The new law equalizes the depletion between operators in the same industry. Under the original discovery law of 1918, the amount of depletion obtainable by the taxpayer on discovery wells varied from 20 to 75 per cent of the market price of oil (gross income). Co-owners in the same discovery well did not even get the same depletion unit. The taxpayer who could drive the best bargain with the Revenue Bureau officials got the largest percentage, much to the disadvantage of his competitors who could secure an allowance of only perhaps 20 or 30 per cent.

On the whole, the advantages of the new law are that the responsibility is assumed by Congress and is not dependent upon the judgment of an engineer or auditor in the department; simplicity of application because the law is specific; engineering appraisals for discovery valuation are eliminated from the government's routine work; elimination of filing elaborate schedules, maps, history, and other data, on the part of the taxpayer, thus reducing his expenses; and the cessation of valuation conferences for the purpose of determining a depletion value, obtainable at present only after a long series of bargainings, resulting in the practical annihilation of taxable incomes by discovery depletion. Another cause for delay in tax settlement is thus removed, as in the case of combining the capital stock tax with the corporation tax. Our tax laws in many cases are not specific—leaving too much room for argument, resulting in endless controversy.

Metallurgic Economics

ILLUSTRATIONS of the truism that the best metallurgy is that which makes the most money out of an ore appear frequently. None is more apt, however, than the change made recently by the Tintic Standard Mining Co., of Tintic, Utah, in the disposal of its low-grade siliceous silver-lead ore. Heretofore, lead smelters have been considered the potential competitors of the company's own chloridizing-roast brine leaching plant. The margin in favor of the continued operation of the leaching plant has always been small; but it has been decisive. Possibly the erection of the



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This equipment proved such an improvement over our old installation that we ordered, in June the same year, five (5) more of these units.

In July, 1920, we ordered four (4) more pump units with two-hundred horsepower motors, and an additional unit in December of the same year. I take pleasure in advising you that these units have given excellent service. You can see from the repetition of orders that we are well satisfied with the equipment."

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Percy, but attend the annual meeting of the Geological Societies and judge for yourself whether there be candidates, and how many; and then have it *per se* if you wish.

"I have found you an argument," said the admirable Dr. Samuel Johnson on one occasion. "But I am not obliged to find you an understanding." Yet an understanding may eventually be accomplished, in spite of the din of the rituals of the adepts. By persistent hammering, Ph.D.'s and others may finally learn that "replacement" is not in the slightest degree an evidence of "attenuated solutions"; that concentrated solutions and even dry melts accomplish replacement; that the microscope does not take the place of the bean; that the situation of an ore deposit on or near an igneous contact is not proof of deposition from "magmatic waters given off from the rock at the moment of consolidation"; that there are not always low temperatures in rocks near the surface—as, for example, in volcanic regions; and a host of other ABC's which should be taught in the primary grades. And after that, the advanced courses will be in order.

Progress in Making Steam

OFTEN it takes an unnaturally long time to arrive at a perfectly natural result. An interesting example of this is to be found in recent developments in boiler design. Years ago engineers said that the natural way to build a boiler was to build it around the furnace instead of constructing the furnace around the boiler. The latter way, which has long been the standard, is characterized by two important defects. First and foremost is its failure to utilize sufficiently the radiant heat of the fire; and second, more or less trouble is had with the refractories used. Both of these defects are largely eliminated in the new steam generator recently introduced to the market and described briefly in *Mining Journal-Press* of Feb. 13 last. In this boiler practically the entire heating surface is exposed to the radiant heat of the fire.

Much greater capacity per square foot of heating surface is thus obtained in the new steam generator through better use of the radiant heat. A boiler horsepower, by definition, is the ability to evaporate 34.5 lb. of water from and at 212 deg. F. Makers customarily allow 10 sq.ft. of heating surface per horsepower. In fact, it has become the fashion to rate boilers in terms of their heating surface, discarding the term horsepower. Thus, as normally rated, a boiler is expected to evaporate 3.5 lb. of water from and at 212 deg. F. for every square foot of heating surface. It is expected, however, to get 1,500 per cent rating with the new boiler, or, in other words, fifteen times 3.5 lb. of water evaporated from and at 212 deg. F. for every square foot of heating surface—that is, a little over 50 lb. It has been customary to get in other pulverized-coal-fired furnaces an evaporation of 40 to 50 lb. in the water screen used to cool the ash, this screen being exposed to the radiant heat. This high rate of evaporation is expected for the entire heating surface of the newly designed unit. Besides this generator, another boiler of different design but similarly making maximum use of the radiant heat, has recently been developed in Canada. Both boilers, though new, utilize for the first time knowledge that is old. The surprising thing is that it has taken so long to do it.

Forty Square Miles and 185 Mills

AN OBSCURE ITEM emanating from Joplin last week, to the effect that 185 mills are now operating in the Oklahoma-Kansas-Missouri lead-zinc district, emphasizes the importance of that area not only as a producer of zinc but as a metallurgical center. Certainly, in no other mining region of equal extent anywhere else in the world is so much going on, and yet comparatively few mining engineers take any particular interest in developments there or have ever visited the district. In fact, even the names of the principal companies operating there are not generally known.

If a mining engineer woke up to find himself in Salt Lake City some morning, he would immediately plan a visit to the Utah Copper mines and mills, to the Midvale mill and smelter, to the Murray and Tooele smelters and the Tooele mill, and to the numerous interesting mines and mills around Tintic and Park City; but if he woke up in the railroad station in Joplin the chances are that he would not know whether to turn to the left or turn to the right and walk up to the Conner Hotel, or who to see, or where Miami and Picher are, or how to get there. In short, the district has not been sufficiently advertised. Shares in most of the companies operating there are not heard of on the New York Stock Exchange, nor even on the New York Curb; mining engineers of reputation in the district seem to find their surroundings there sufficiently congenial to stick, and not go wandering around the country; and mining, milling, and smelting problems are considered rather simple and of local rather than international interest, so not a great deal has been written about them, at least in recent years. In fact, the general opinion of outsiders is that the miners are good farmers, and that there can be little of interest in a district where the ore is hoisted in "cans" holding a fraction of a ton, and where slow-speed Cornish rolls and jigs are still important items of mill equipment. Is not the ore, after all, only dirt, and the concentrates only ore, by the admission of the very operators themselves?

And yet, many things are taking place in this district, which, incidentally, is only about eight miles long and five miles wide; things which are worth the attention of mining engineers generally, and of mining equipment manufacturers as well. The old crude methods are rapidly being displaced, and a large number of the 185 mills reported to be in operation are not toy plants that can be moved overnight from one location to another but real concentrating plants. Ball mills are beginning to be installed; concentrating tables are common, mostly manufactured by one astute engineer who early appreciated the problems and possibilities of the district; a large proportion even if not a majority of the mills have flotation machines, also largely of one type put out by a maker who was quick to see the opportunities in the field; and vacuum filters, formerly a novelty around those parts, are now beginning to be seen.

Operators in the so-called Tri-State District certainly have reason to be proud of what they have accomplished in the last year or two; also a bow of appreciation should be extended to the Mississippi Valley station of the Bureau of Mines, the Missouri Bureau of Mines and Geology, and the Missouri School of Mines, all of which have co-operated in getting the district into more economical production of the metals with which it was so richly endowed by nature.

plant, built in 1921, at a cost of about $600,000, was not actually justified; but once built it performed well enough to withstand the best offers of the lead smelters. Now, however, it has been shut down; and the reason is the bid of the Garfield *copper* smelter for the ore!

The roasting-leaching plant and the operations in it were described in some detail in the *Mining Journal-Press* of Aug. 22, 1925. Cost per ton of ore, including refining, marketing, all overhead, and plant depreciation, was $4.49 per ton in 1924. Recoveries averaged 87.6 per cent of the silver, 32.4 per cent of the lead, and 59.8 per cent of the copper—of which the ore contained only about 0.4 per cent. These results, particularly the lead recovery, were improved materially in 1925. Assays of the plant heads range from 12 to 20 oz. silver, 2 to 6 per cent lead, 65 to 75 per cent silica, 4 to 10 per cent iron, and 0.25 to 0.4 per cent lime.

No less than three lead smelters are situated in Salt Lake valley, all enjoying a low freight rate from the Tintic district. Competition is keen among the various companies, and the Tintic Standard is a large shipper of very desirable high-grade smelting ore. Consequently, the company was in a position to get the best rate possible on its low-grade ore.

However, the mines tributary to the Salt Lake smelters supply an excess of siliceous lead ore; as a consequence scrap iron and barren iron ores must be supplied as flux on the furnace charge. For this reason it is customary to penalize silica at 10c. per unit in dry ores, thereby making the smelting tariff sufficiently high to consume the entire value of the lead where there is less than, say, 5 per cent in the ore. This particular economic condition has an important bearing on the value of ore of this character and upon the metallurgical treatment.

On the other hand, the Garfield smelter needs silica in the charge going to its copper reverberatory furnaces. The principal source of copper concentrates is the Utah Copper Co., which, since the development of flotation, has made a concentrate high in copper and iron but very low in silica. During the days of "gravity" concentration, the product was virtually self-fluxing; but that condition now has changed. The smelting company was faced with the necessity of supplying silica, and to that end it purchased and shipped to Garfield many thousands of tons of material from old mine and mill dumps in the Tintic district. This source of supply cannot last indefinitely and the company must either find siliceous ores containing some recoverable metal, or use barren siliceous rock—an expensive procedure at best. One other remedy would be to arrange to have the Utah Copper Co. change its concentrating practice so as to leave more silica in the concentrate, but this would destroy the benefits of the efficient concentration by flotation.

Obviously, the low-grade lead-silver ores in the Tintic Standard mine were attractive to the Garfield metallurgists; but the loss of the lead in the copper smelter was for a time the big obstacle in the way of purchasing it. This difficulty now has been overcome by the installation of additional Cottrell smoke-treating equipment. Improved efficiency in this department has enabled the smelting company to recover a sufficient proportion of the lead in the ores to make it feel justified in paying the Tintic Standard company for that metal as well as for the copper and silver.

Although the terms of the contract cannot be divulged, it is obvious that they are much more favorable than Utah lead smelters could give, and that they likewise provide a fair margin of profit over what the Tintic Standard company could make by continuing to operate its own reduction works.

How much of the lead is recovered probably no one knows; nor is it known how much silver is lost unavoidably with such lead as eludes the Cottrells and goes up the stack. However, the smelting company is satisfied that the ore is worth more to it than the Tintic Standard company can realize by its hydrometallurgical treatment. Modern metallurgy assays rather high in economics.

Free from Milling Ore

THE Associated Press, reporting the gold excitement in the Red Lake region of northwestern Ontario, states in part: "Major C. J. A. Cunningham Dunlop, of Haileybury, Ont., a veteran northern prospector, has returned from Red Lake with a description of a large vein of visible gold, mostly free from milling ore."

Here is plainly to be seen the baneful pencil of the editor concerning which some of our contributors write us from time to time. Doubtless the statement came to the desk of the omniscient one, reading "a large vein showing visible gold, mostly free milling ore." The spectacled one saw in the flash of an eye that that did not make sense and could not be construed by Halls' Rhetoric, so he made it read what it should. And his improvement will probably pry loose various clerks from their desks and start them out on a life of adventure.

The Scientific Spirit

If it's noo, it's not troo;
If it's troo, it's not noo.
If it's noo, it's not troo;
If it's troo, it's not noo.
If it's noo, etc.

—*Official Anvil Chorus* (with Geological Hammers)

There are reported to be fifty-two couplets in this chorus, but they have been standardized, according to the recommendations of the Division of Simplified Practice of the Commerce Department, thereby eliminating much waste. The reader may comment that if the first two couplets, which introduce the theme, had also been omitted, a further elimination of waste might have been accomplished. But, no—the sound cardinal principles involved have been a great consolation and give a feeling of solidity to the great body of American geologists—of which we are all proud to be one—and especially to the Association of Geological Authorities.

Election into the society is known to be automatic—if that is the right word; that is, a man concentrates, and thinks himself into the society without outside assistance. He has only to repeat to himself "I am Napoleon" seventy times at sunrise and sunset for seventy days and the miracle is instantaneously accomplished. Thereafter all scientific problems are easily solved by the application of the Great Triad of tests: 1. Is it noo? If so, it isn't troo. 2. Is it troo? If so, it isn't noo. 3. Did I have a hand in it? If not, it's neither troo nor noo.

A correspondent has written in, asking whether geologists as a group are *per se* eligible to the Society of Skitterers and Twitterers of America. Not *per se*,

company's records are very complete, however, and during the last few years they have been carefully searched, so that the facts of the company's history up to the present time may be readily ascertained. The adverse opinion that some have had probably had its origin years ago, when the shutdown of the silver works took place during the last ten years of Danish administration, from 1805 to 1815. It is also probably due in part to the effect during the last generation of the decreasing price of silver, which was caused by the abandonment of bimetallism. Thus it has been that the public, in part at least, has acquired the idea that the Kongsberg operation was an unfortunate undertaking.

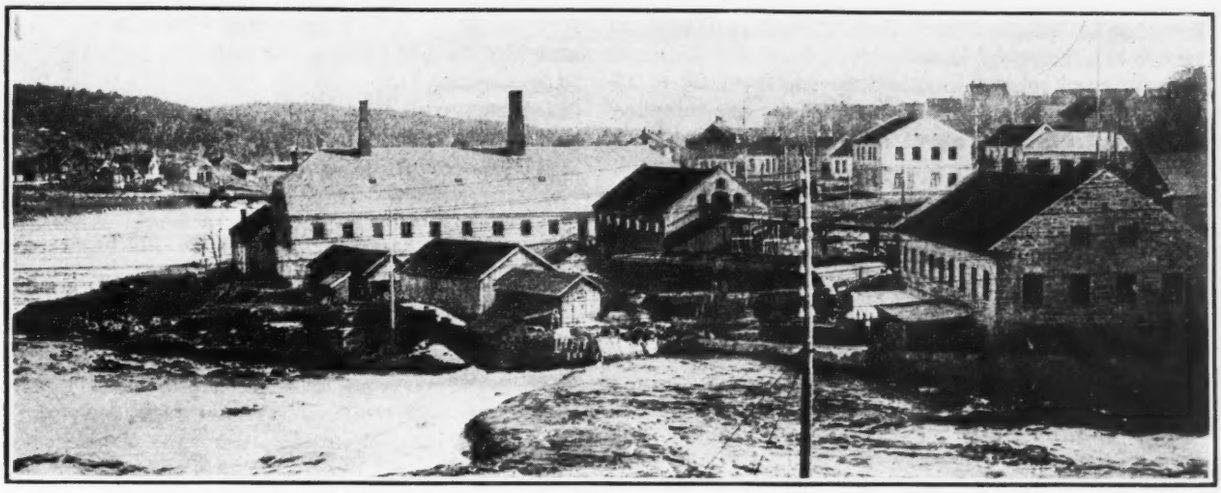
The facts are, however, that in the 300 years from 1623 to 1924 about 1,117 tons of fine silver was produced and sold for about 162,000,000 Norwegian crowns. Expenses amounted to 155,900,000 crowns, including construction costs, so that the operation has yielded a net profit of about 6,100,000 crowns. During the first period of the Danish régime, until 1768, there was a total profit of 6,200,000 crowns, and from then on up until 1805 operations gave a loss of 15,100,000 crowns. Technical difficulties and inefficient methods were responsible for these poor results. In order to keep going, more and more mines were opened as the older workings deepened, this causing the working force to be greatly increased. About 1772 the number of employees had reached approximately 4,000. During the years 1854 to 1865 a fund of 4,000,000 crowns was established, out of the profit of those years. The interest on this fund totaled 11,000,000 crowns up to the end of 1924. Of this interest 6,800,000 crowns has been applied to cover the deficit for the period from 1889 to 1924, leaving a net amount to the government at the end of 1924 of 4,200,000 crowns.

Since 1815, when the mines were taken over by the Norwegian Government, operations have been very profitable. The results since 1815 are given in Table I. After paying all construction and operating costs the Silver Works have yielded in revenue to the state during the 109 years from 1815 to 1924 a total of 15,000,000 crowns. Profit accruing from the forests belonging to the mines is not included. Counting all sources of revenue, the public has had an annual profit of 200,000 crowns since 1815. Up until the present year the Norwegian administration has not amortized the cost of buildings and machinery in a business-like way, but has charged all such costs in the year in which they were incurred, such practice, of course, being very misleading as to the financial condition of the company.

Table I.

Period	Income, Crowns	Expenses, Crowns	Profit, Crowns	Deficit, Crowns
1815–64	32,600,000	15,100,000	17,500,000	
1854–65	.....	.....	.....	.....
1865–69	2,900,000	2,000,000	900,000	.....
1870–88	14,000,000	10,500,000	3,400,000	.....
1889–1924	23,400,000	30,300,000	.....	6,800,000
1815–1924	72,900,000	57,900,000	21,800,000	6,800,000

The difficulties in the labor situation created by the Great War have been further augmented in Norway since the armistice and are still present. Table II, which is based upon the official records of the annual operation of the company, tells more than words. It shows the wage index and the silver price index by years from 1914 to 1924 inclusive. The daily wage of 4.6 crowns that was paid in 1914 is taken as unity for the wage index. A silver price of 27 pence per ounce, which was received in 1914, is likewise taken as unity for the silver price index. It is quite evident that the economic difficulties of the Kongsberg Silver Works have been greatly increased since 1914. As the figures in the table show, daily wages in 1924 were almost four times the wage paid in 1914, whereas the silver price received was only a little over double that received in 1914.

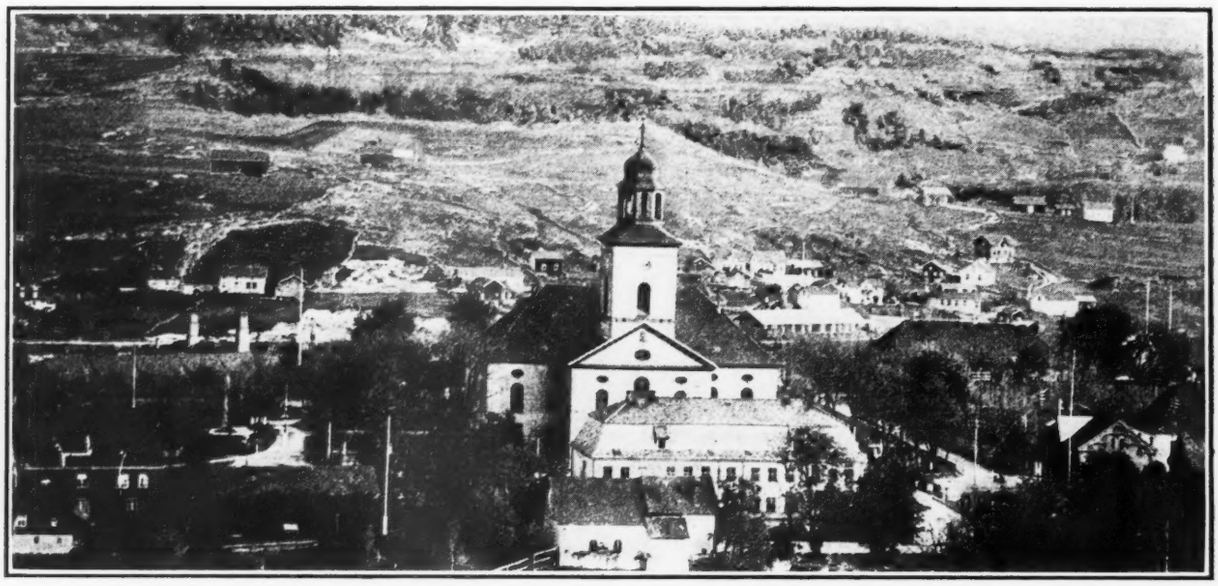


The old smelting plant of the Kongsberg Silver Works that was in use in 1842

Table II. Wage and Silver Price Index Figures, 1914-1924.

Year	1914	1915	1916	1917	1918	1919
Daily wages	1.00	1.01	1.07	1.44	2.03	3.53
Silver price	1.00	0.93	0.97	1.34	1.56	1.98
Year		1920	1921	1922	1923	1924
Daily wages		4.17	5.11	4.92	3.78	3.98
Silver price		2.84	2.19	1.93	1.75	2.17

Thus it has been necessary for the company to seek to increase the silver production of the mines without increasing the number of workmen employed. It was decided to increase the annual output of fine silver from eight to twelve tons. An increase of 50 per cent, such as this, cannot be made hurriedly and, at the same time, in an efficient manner. It, had of course, to be done gradually. In short, the situation was the following: Every effort that had been made up to 1914 to modernize the plant had been without effect in the face of the increasing cost of wages and supplies and also in the face of decreased working time. The plants existing



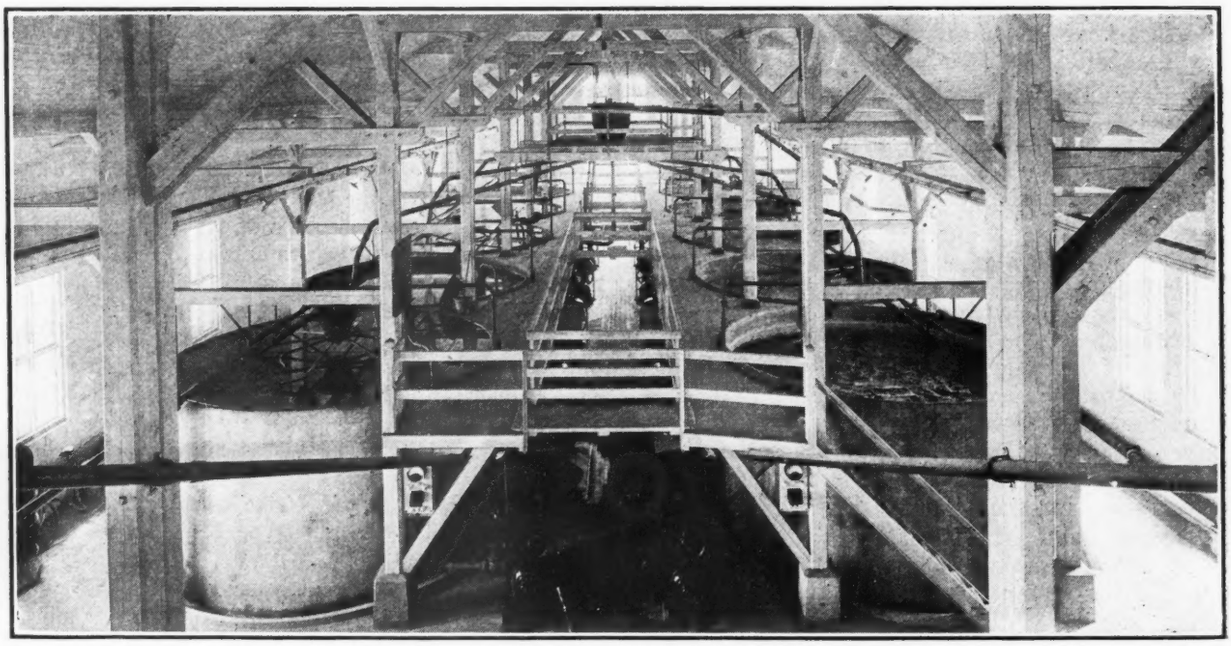
The Kongsberg church, erected in 1761, is seen, and near it the former mining seminary building, in which was housed one of the earliest mining schools of the world, and which is now used by the manager of the Kongsberg company for his home

Kongsberg—A Three-Century-Old Silver Camp

Modernization of Plant and Methods of the Norwegian State-Owned Enterprise Is Expected to Improve Financial Results

By R. Stören
Mining Engineer, Kongsberg Selvverk, Kongsberg, Norway

INTEREST in the Kongsberg Silver Works, at Kongsberg, Norway, has been greatly stimulated by the recent tercentenary celebration of the opening of the mines. The Kongsberg Selvverk, as it is known in Norway, is a public property operated by the state; so it is natural that the public has taken a more than ordinary interest in its affairs, all the more so because of the difficult situation in which the mines have found themselves since the war. Considerable conflict in public opinion with regard to the financial status of the operation has been apparent at times in recent years owing to the depression in mining, and some members of the Storthing have even gone so far as to suggest the shuting down of the Kongsberg plant. An idea apparently has gained currency in certain quarters that these mines have cost more than they have produced. The



Kongsberg's new cyanide plant that was recently erected. The arrangement of the leaching tanks is shown

in 1918 were too small and the means of transport between two groups of mines were too heavily loaded to permit operations to be forced. It was quite evident that this increase of 50 per cent in output could be secured only by adopting an important program of development. It was also planned to rebuild in part the plants, so that the works might be centralized near the mouth of the main adit. The two groups of mines have been connected by a crosscut. These plants were finished, in 1923, and their flow-sheets brought up to date, especially that of the cyanide plant, which has been equipped with modern machinery and has a relatively high capacity. The capacity of the plant has been more than doubled. In place of the 10,000 tons of crude ore that could formerly be treated, the plant is now able to handle 30,000 tons. The silver content of the ore has, however, been lowered from 850 to about 450 grams per ton, or, in other terms, from 27 to 15 ounces per metric ton. Two grades of ore are mined—namely, one containing about 300 grams of silver per ton, and the other about 10 per cent silver. The operation, furthermore, is to be conducted with about 225 workmen, against approximately 300 who were formerly employed.

However, the ameliorating effect of reconstruction of the Kongsberg plant will not be felt appreciably for some years, owing to prevailing economic conditions. Wages cannot be expected to drop too quickly. In the meantime efforts are being made to find new orebodies so as to secure the future.

Without doubt the Kongsberg Silver Works is only a small operation and the output of the company counts for nothing in the market. The project, however, is well known for various reasons, among them the interesting geology of the deposits and the extraordinary form in which the silver occurs. Geologists from abroad annually visit the plant. Despite the fact that the company already has a history extending over a period of three centuries, it is likely that the end is not yet, but that production will continue for a good many years.

Conveying Ore at the Ajo Plant

Details of the System of Belts Used at New Cornelia Copper Co.'s 5,000-Ton Concentrator

THE new concentrating plant of the New Cornelia Copper Co. is of 5,000 tons' capacity, though at present it is running considerably over this. From the first, it has run smoothly and has been a credit to the skill of its designer, H. Kenyon Burch. The plant was built to treat a large body of sulphide copper ores found underlying the carbonate ores formerly treated in the leaching plant which occupied practically the same ground as the new concentrator. Construction was carried on in units. The first unit was erected and producing before the others were completed. This worked out well, and all the wrinkles were ironed out before the last units of the plant were completed.

The ore is mined by steam shovels using 4-cu.yd. dippers, and is hauled about a mile to the plant in 20-cu.yd. automatic dump cars. It is dumped into a concrete receiving bin holding 500 tons at the head of the primary crushing plant. Some of the ore runs very large. This ore is handled on a pan conveyor 8 ft. wide by 75 ft. long, at the rate of 10 ft. per minute, and is dumped over the primary crusher uniformly. The crusher reduces it to 6 in. size. This product is delivered by S-A belt conveyors traveling at the rate of 450 ft. per minute to an intermediate 6,000-ton steel storage bin. The belt bringing this material up is a 48-in. belt which discharges to a second 42-in. belt, which in turn deposits the material into the intermediate bin by means of a tripper.

The tripper is of steel-frame construction and of special design. At the bottom of this bin the ore is passed by apron feeders to four short 36-in. belt conveyors which travel at 100 ft. per minute. These conveyors deliver their product to four intermediate crushers which are protected by four 48-in. Burch grizzlies. After passing through these crushers and through the grizzly, the product is taken at the rate of 350 ft. per minute on four 24-in. belt conveyors from the intermediate crushing plant to crushers in the roll plant, which are again protected by 48-in. Burch grizzlies. The grizzlies above the crushers have a 2-in. opening. This material is brought down to 1¼ in. through the crushers, joins the by-passed undersize and goes onto the conveyors beneath and to the rolls. The rolls are 78x24 in.

This crushing plant, including both the intermediate crusher and the rolls, is divided into four units, which are entirely separate and fed from underneath the intermediate bin with separate feeders, the ore being carried from these feeders to the crushers and rolls on separate belt conveyors. From under the rolls the product is delivered by two long belt conveyors, one 48 in. wide and the other 42 in. wide, at speeds of 400 and 450 ft. per minute respectively, which carry the ⅝-in. to ¾-in. product to a 10,000-ton fine-ore bin at the head of the concentrator proper. This bin is of steel construction, parabolic in shape, and 300 ft. long. The product is discharged onto it by means of a belt conveyor tripper. The material is drawn from under this bin by manually operated gates onto 42-in. feeder belts running parallel with the length of the bin. Each of these belts is 26 ft. long and is driven at variable speeds, avaraging around 30 ft. per minute.

The belts discharge to a single 24-in. conveyor which feeds the primary rod mills. From these mills the material passes to classifiers and from there to secondary rod mills and to a secondary classifier, and then to flotation machines. From these machines the concentrates are laundered to concentrate thickener tanks and then to the filter plant. A 24-in. belt conveyor 375 ft. long, traveling at 250 ft. per minute, discharges the concentrates from the filter plant directly into the concentrate car. The tailings are laundered from the flotation machines to concrete sand boxes from which the slimes are caused to overflow into a concrete slime thickener tank.

All crushing operations in the plant are protected by magnetic pulleys on belt conveyors in proper places, and in addition heavy magnets are hung over some of the belts as an added precaution. The output of the roll plant and of the grinding plant is recorded by means of weightometers used on the belt conveyors. In the grinding plant this record is kept by units, of which there are five, each extending at right angles to the large 10,000-ton fine-ore bin.

A Trip to Peru

Conditions Affecting Mining on the Eastern Slope of the Andes in the District of Puno, as Observed on a Recent Journey, Favor Only Precious Metal Projects

By Lucien Eaton
Mine Superintendent, Ishpeming, Mich., Cleveland-Cliffs Iron Co.

Lucien Eaton

IN THE first half of 1925 I had the opportunity to do some work in the *montaña* or wooded country, on the eastern slope of the Andes Mountains in the provinces of Carabaya and Sandia, in the district of Puno, in southeastern Peru. As this mining district is seldom visited and as little has been written about it, these notes about the climate, topography, transportation facilities, labor supply, and other conditions affecting mining operations there may be of interest.

The physiography of Peru has an important effect on the climate and in turn on population and industry, and no discussion of industrial conditions is complete without a statement of the physiographic and climatic conditions. There are three principal regions in Peru, the coastal plain, the *sierra* or high mountainous region, and the *montaña*, or jungle country of the upper Amazon basin.

Peru's coastal plain is arid, and rain seldom falls there. This is partly because of the fact that the high mountain ranges to the east precipitate most of the moisture carried by the warm east winds that blow up the Amazon Valley, and partly to the effect of the Humboldt Current, a cold antarctic ocean current that flows up the west coast from the south. During most of the year this current is cooler than the land, so that the moisture in the air is precipitated over the water rather than on the land. During the last year this current changed its course, for some unknown reason, and sporadic heavy rains fell at various points on the coastal plain.

In southern Peru the coastal plain takes over a large area the form of a high plateau, separated from the ocean by a coastal range. This plain has some rich irrigated valleys where streams fed by the snows of the western cordillera break through to the sea. At the higher levels, barley, corn, and other grains are raised in these irrigated valleys, and rice, sugar cane, and cotton near the coast. Except in these valleys the country is practically uninhabited.

The "Titicaca Level"

The *sierra* consists of two high mountain ranges with many peaks over 20,000 ft. in height, separated by a broad, high plateau. Investigation has shown that the western range, called the "Black Cordillera," is largely of volcanic origin, but the rocks of the eastern range, or "White Cordillera," so named from its peaks covered by perpetual snow, are largely sedimentary. The plateau between the ranges is called the "Titicaca Level," and has an elevation of more than 12,000 ft. It is the old bed of Lake Titicaca, which at one time must have been several times as large as it is now. The Titicaca Level and the corresponding mountain valleys to the north were thickly populated during the Inca rule in the fifteenth and sixteenth centuries before the Spanish Conquest, and are now the principal source of labor supply for southern Peru. Here the climate is semi-arid, and the principal industries are grazing and agriculture. Native alpacas and llamas thrive, and sheep and cattle are successfully raised, although the stock is in general of poor quality. Many of the cattle show the zebu strain. The Indians themselves are short in stature, with small hands and feet, narrow hips, and deep chests. Potatoes and the hardier grains, particularly barley and wheat, are raised by the natives in the valleys.

On the eastern slope of the eastern range, or White Cordillera, the rainfall is extremely heavy at the lower elevations, and snow is of almost daily occurrence at the high altitudes. Snow line is at about 17,000 ft. and timber line at about 11,000 ft. There are few passes south of Cuzco, the principal one of these being Aricoma Pass, which has an elevation of approximately 16,000 ft.

In the Montaña

East of the White Cordillera is the *montaña*, or wooded region, extending down to the Amazon River. "*Montaña*," or "*monte*," as it is usually called locally, really means jungle, and is not like any forest that I have ever seen in North America. The trees are not usually very large, the undergrowth is thick, and the ground is covered with moss. Climbing plants are everywhere, so that travel off the trails is almost impossible. For about fifty miles east from the crest of the Cordillera the topography is very steep, the rivers are torrential, and transportation is very difficult. Rainfall is from 180 to 250 in. per year, and the woods are always wet, except in the short dry season in July and August. The mountains are the result of erosion, although there is practically no erosion from the rainfall in the usual way, because the ground surface is thoroughly protected by vegetation. Erosion takes place in the stream beds, and, when the cañon walls have become so steep that the angle of repose of the rock has been exceeded, landslides, or *derrumbes*, occur, often running back thousands of feet to the top of the ridge. As a consequence, slopes greater than 45 deg. predominate.

Transportation is, of course, extremely difficult and practically impossible except where trails have been cut. The principal highway into the interior is the

Santo Domingo mine of the Inca Mining & Development Co., along the Inca Trail

Inca Trail, built by the Inca Mining & Development Co. from Tirapata, 60 miles north of Lake Titicaca, on the Southern Railway of Peru, to Astillero, on the Madre de Dios River, crossing the eastern Cordillera at Aricoma Pass. For the first 102 miles from Tirapata to Huancarani the trail is a wagon road, passable for trucks or automobiles except in the worst of the rainy season, but from Huancarani to Astillero it can be used only by foot passengers, mules, llamas, or cattle. The trail is 5 or 6 ft. wide in most places, and for the greater part of the distance from Huancarani to Santo Domingo, 43 miles, is cut from the solid rock, often from the face of a vertical precipice. It follows the valley of the Quitun River, which is crossed at several points on suspension bridges, as far as the junction of the Quitun with the Wari Wari River, the river below the junction being called the Inambari. At one point the trail is 1,200 ft. above the river, on the face of an 80-deg. slope. A single-wire telephone line follows the trail, which is maintained in good condition by the Inca Mining & Development Co. for 145 miles, as far as its mine at Santo Domingo; but from Santo Domingo to Astillero, five days' journey, it is under governmental care. Other trails branch off from the Inca Trail to such districts as Macusani, Sandia, and Pulqui Mayo.

Vegetation Varies With Altitude

Except for a few stunted cedars there are practically no trees or bushes from Tirapata to Aricoma Pass, but as soon as the pass has been crossed, vegetation increases rapidly. Flowers and shrubs begin to appear at 14,500 ft., particularly begonias and a species of wild pineapple, and trees and bushes cover the hill below 11,000 ft., although this line is not absolute either way, some places being wooded above this elevation and some bare, except for grass, below it. Trees of size are not found above 8,000 ft. Below 8,000 ft. the vegetation is typical of the tropics, air plants, giant ferns, *palmito*, *palo santo* trees, camphor-wood and lignum vitæ being abundant. I do not know the names of most of the trees, but in general they are divided into the two classifications, hard and soft. The hardwood trees have small leaves and grow slowly, and have both red and white wood. The softwood trees have large leaves, grow quickly, and usually have white wood. Their lumber is light and rots quickly. The hardwoods are strong, and the red varieties resist decay very well, and are excellent for mine timber.

The undergrowth is a tangled mass of vines, bamboo, *carrizo*—a wild sorghum—ferns and moss, and is unpassable, except with the aid of a machete. All the trees are covered with parasites, and orchids of many varieties are common. Flowers of many kinds are found, but with the exception of the begonias are not as abundant as might be expected. Their unusual characteristic is that they have no odor, even the cultivated roses being without scent.

Agriculture Limited

There are a few small farms, or *chacras*, belonging to Indians, on the mountain sides along the rivers of the eastern slope as far as the Inambari River, and small quantities of Cuzco corn, a maize with very large kernels, is raised. Around the Indian villages near timber line potatoes also are raised, and yucca and coca, a shrub from which cocaine is obtained, are raised in the lower and warmer valleys below 5,000 ft. Except

Shops at Santo Domingo mine

in the case of potatoes and coca the Indians raise very little more than they consume themselves. There have been a few coffee plantations at elevations around 8,000 ft., but most of them have been abandoned. The coffee produced is of excellent quality.

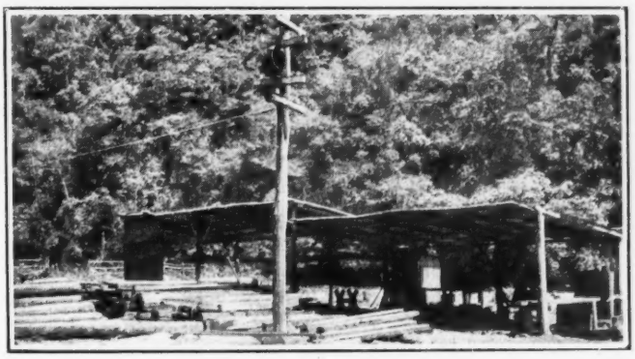
On the western slope of the western Cordillera, except right along the coast line, there is practically no animal or bird life, but between the ranges ducks, geese, plover, curlew, and other water fowl are abundant. There are no game laws in Peru, but as all guns have to be licensed, the fee being one pound a year (the Peruvian pound is now equivalent to $4 gold), and as ammunition is very expensive, little shooting is done.

On the eastern slope deer and bear are found along timber line, but the *monte* itself is singularly bare of animal life. There are a few rabbits and *waris*, or possums, and occasionally *perdis*, or partridge, and wild chicken, *gallino de monte*, are found. At the lower elevations there are wild turkeys, parrots, and monkeys in the river valleys, but nowhere is game sufficiently abundant to enable prospectors to live on the country. Cats of the jaguar type, locally called *tigres*, are common in the valleys, and there are pumas in the mountains. Snakes are often found along the trails. Snakes, monkeys, and cats, and particularly the heavy rains, account for the scarcity of both animal and bird life.

Near the crest of the eastern Cordillera at Aricoma Pass there is a large area of syenite, and there are other exposures of igneous rocks, but the principal

country rock is slate, which is said to be of Silurian age. The country shows signs of glaciation down to an elevation of 12,000 ft., but I saw no glacial boulders below that elevation. Slate covers most of the area of six provinces, or counties, with rare occurrences of quartzite and sandstone, and occasional dikes. East of the Yucurri River the prevailing rock is a soft red sandstone. Throughout the slate area there has been much folding and minor faulting, but major faults seem to be rare. At least they are hard to find. The whole country is rich in quartz veinlets and stringers, many of which carry free gold, and gold can be panned from the gravel in almost all the river beds. There are many placer deposits, some of which are of great size, left as terraces high up on the slopes of the mountains, and several of these have been worked, but none, I believe, successfully in recent years. Even on these large deposits no real development work has ever been done, and figures as to yardage and gold content are only guesses, or at best rough estimates. It is quite likely that some of the large placers could be made to pay handsomely if enough preliminary work was done to determine their extent and value and if sufficient water was brought in to move several thousand yards per day.

Many of the quartz veins have been worked, but all except the Santo Domingo mine have been without adequate equipment and have had short lives. The gold is free-milling, but the ore is very irregular in occurrence and value, and there is seldom enough in one place to pay for its extraction. High cost of transportation, supplies, and food, and the difficulty of



The sawmill at Bella Pampa

obtaining power, make operation expensive, and the steepness of the topography and the impassable character of the jungle make exploration extraordinary difficult, if not impossible, except during the short dry season. At this time of the year it is possible to work up and down the stream beds, and examine the exposures of veins in the cañons and in the bare places where slides have occurred.

Flies, Fleas, and Other Diversions

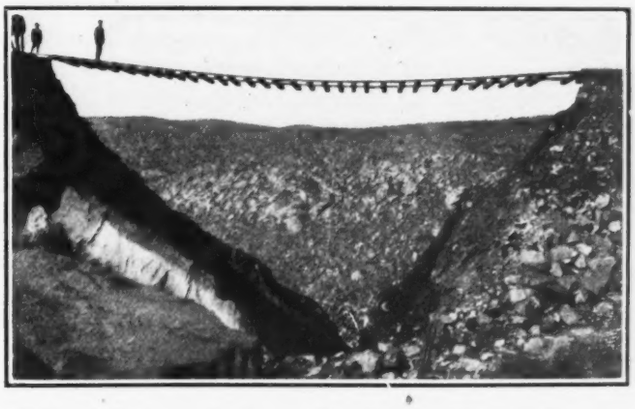
Above 7,000 ft., flies, mosquitoes, and fleas cause little inconvenience, but they are a pest along the valley of the Inambari River, except during the dry season. The *moscas*, like small sand flies, and the *mantas blancas*, like our northern midgets, are very disagreeable. Fortunately there are not many mosquitoes, and there is no malarial fever in this part of the Inambari Valley. The Indians are usually lousy, and the dogs and llamas have fleas, and it is difficult to avoid these insects. Lice, however, cannot stand water, and fleas cannot stand altitudes above 9,000 ft. Three-in-One oil was found to be the best protection against all these insects. Below 4,000 ft. the vampire bats are a nuisance. If beds are screened, or if there is artificial light, the bats do not disturb man, but they work havoc among the mules, especially when the animals are tired and in poor condition. The bites of the bats are responsible for many of their saddle sores, and the loss of blood is a serious drain on their strength. If there are low bushes in the pasture, the mules can brush the bats off, but the best protection is to have a screened corral or barn protected with chicken wire of one inch or smaller mesh.

White men are seldom bitten by snakes, but the barefooted Indians sometimes suffer. Death from this cause is, however, rare. The commonest poisonous snake is colored red, black, and gray in squares like those on a small checkerboard; the green snakes are not poisonous.

The commonest and the most impressive forms of insect life are the moths and butterflies. They are quite characteristic of the upper Amazon country, and nowhere else in the world, I believe, are they found in such numbers and variety or of such great beauty and size.

The Problem of Transportation

Transportation is the greatest problem of the district. Nearly everything must be imported from the United States or Europe, except a few articles of food and clothing. Mail service is poor, and it takes from three to six months to send an order to the United States and get the goods delivered. Freight is carried by steamer from New York to Mollendo, where it is unloaded on lighters. After passing through the customs, it is shipped inland on the Southern Railway of Peru to Tirapata. Here everything that will be injured by water, such as flour, sugar, rice, drygoods, shoes, and so on, must be repacked and sealed in tin, usually in weights of 50 lb. (23 kg.) or 100 lb. (46 kg.). The weight and contents of each tin (*lata*) are marked on the outside with paint. Machinery and mine supplies must be securely packed in strong crates or boxes weighing not over 300 lb. and preferably not over 150 lb. Pipes, rails, iron bars, and drill steel must be shipped in 8-ft. lengths. Dynamite and fuse are wrapped in water-proof paper and covered by tarpaulins. Caps are packed in tin inside the wooden boxes, and are usually sent over the trail on men's backs for safety. All boxes or tins to be carried by llamas must not weigh more than 50 lb., for a llama will carry just so much and



Effects of a washout on Southern Railway of Peru, February, 1925

no more. If more than a certain weight is put on his back, he will not get up, no matter what persuasion is used.

Shipment by wagon or truck over the road to the end of the trail is quicker than by mule, but the cost is about the same by both methods. Mules make 25 to 30 miles a day on the road and half that on the trail. Llama-freight costs approximately half as much as mule-freight, but it takes twice as long and is very uncertain. Losses in transit are high.

All shipments from outside of Peru must be accompanied by consular invoice with a description of the article in both Spanish and English. Transportation from New York to the Inambari Valley costs on the average 10c. a pound. For explosives the rate is considerably higher.

Mining supplies can be purchased at Cuzco and Arequipa, in Peru, and at La Paz, in Bolivia, but it is cheaper to ship them directly from the United States or Europe. Potatoes, meat (on the hoof), rice, native flour, sugar, onions, cheese, butter, bananas, pineapples, and a few vegetables can be obtained in the country, some locally, but practically all other food must be imported.

Clothing can be obtained in Arequipa and Cuzco, and blankets, woolen cloth, socks, and similar materials

Quitun River, southern Peru, at about 9,000 ft. elevation, showing possibilities of hydro-electric power development

made from the native wool can be bought at many places along the railroad. Practically all mining equipment and supplies must be imported.

"White Coal" Most Reliable Source of Power

In the interior there is neither coal nor oil. Charcoal can be bought from Indian charcoal burners, and timber can be cut locally. It is, however, too expensive to be used as fuel under boilers, and reliance must be placed on hydro-electric power. The small streams have very steep gradients, up to 10 per cent, and the topography favors high-head installations. Storage of water behind dams is impracticable, both on account of the steep gradient of the stream bed and because of the large amount of detritus carried by the water. If a dam were built, the chances are that the storage basin above it would be filled with boulders and gravel at the next heavy rain. The flow of the small streams is very irregular, but there is a certain amount of storage in the *monte* itself, and except in July and August the shortage of power is not serious. The larger rivers, like the Quitun, have a grade of 1 per cent in their lower reaches, and have a good flow even in the dry season. When in flood, however, they carry immense quantities of material in suspension.

From September to May the rainfall is 20 to 25 in. per month, with the peak usually in February. In the last eight days of February, 1925, the rainfall at Santo Domingo was 22 in. In May and June the rains decrease, and July and August are usually reasonably dry. In spite of the rain the climate is not at all disagreeable, and the showers are often a welcome relief from the heat of the sun. Even in the valleys the nights are cool.

Mine timber and logs for sawing are cut by contract on the mining claims or on timber concessions (wild land can be denounced and bought from the federal government for 1 sol per hectare, equivalent to 16c. per acre), but, on account of the density of the jungle and the steepness of the hillsides, it has to be carried on men's backs, and is therefore expensive. Sawed lumber cut in a small, electrically driven sawmill costs about $50 per thousand feet for labor alone. The contract price for cutting and bringing in a 9x9-in. piece of hardwood timber 8 ft. long is 2.25 soles (90c.), and other sizes are in proportion. Softwood is paid for at half price. Charcoal costs 2.50 soles ($1) per quintal.

Cement is very expensive. It costs 2.20 Peruvian pounds (£p 2.20, or $8.80) per barrel at the railroad. Repacking in tin costs 4.60 soles ($1.84) and freight £p 40 ($16), making the price per barrel delivered at the Inambari Valley $26.64. Quartz sand, suitable for mortar or concrete, is almost an unknown quantity along the larger rivers, and transportation from the small streams is very expensive. Crushed rock gives the best results, unless mine tailings are available. Under these circumstances masonry is much less expensive than concrete.

Population Mostly Quichuas

The native inhabitants of the District of Puno are mostly Quichua Indians, living on farms and in villages scattered over the Titicaca Level and in the valleys on both sides of the eastern range of the Andes as far as the Inambari River. There are very few Indians living below 8,000 ft., and almost none on the east side of the Inambari River. When the Spaniards conquered the country it was thickly populated, and old Inca terraces are found as far east as the Inambari River, but none on the east side of the river. Labor can be contracted for in the villages near the trail, and at Ayiviri, Sicuani, Juliaca, and Cuzco, on the railroad. Transportation is usually paid if a man stays on the job for six months.

Peruvians, half-breeds, Japanese, Germans, English, and Americans can be hired in Arequipa, Juliaca, Cuzco, and La Paz, but the supply is not large and quality is poor. Along the railroad common labor can be obtained at 65 to 75 centavos (25 to 30c.) a day, but in the interior wages vary from 1.50 soles (60c.) a day for common labor to 5 soles ($2) for skilled labor, such as

miners (*barreteros*) and timbermen (*paleros*). Whites receive £p 15 ($60) to £p 20 ($100) per month. Board for the whites costs £p 5 ($20) to £p 7 ($28) per month at the boarding house. The Indians feed themselves, but depend on getting bread and other supplies from the company store. They live on white bread, when they can get it; *chupi*, a soup or stew made of corn, potatoes, *chalona* (dried mutton), and anything else available, and cheese, rice, and *chuno*. The last is desiccated, frozen, bitter potato, and is made on the high plateau in the dry season. They chew coca leaves constantly, and on feast days drink alcohol (25 to 60 per cent strength) if they can get it. In the villages they drink *chicha*, a native beer, made from sprouted maize.

Population Declining

As evidenced by the countless abandoned fields and houses all over the Titicaca Level and in the valleys of the eastern Cordillera, both the numbers and the industry of the Indians are on the decline. Except in the Cuzco and Arequipa valleys they are only a few jumps ahead of starvation, and they seem to have no ambition to better their condition. Four hundred years of Spanish exploitation, the almost universal use of coca, and the prevalence of venereal disease have all been contributary causes.

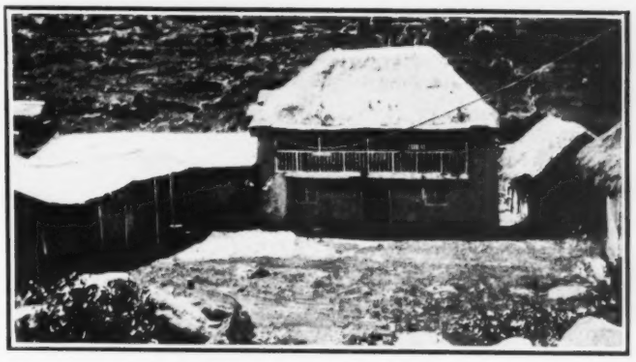
The Quichua Indians are peaceable, reasonably industrious, and fairly honest, but are absolutely uneducated, and have to be taught everything. Many of them cannot count above ten, and have never seen a shovel. The boys under eighteen learn very quickly, and show great promise, but most of them deteriorate rapidly after they pass this age, probably through the use of coca and alcohol and as a result of venereal disease.

Comparatively few of the Indians marry. The women do not want to marry, because, if they did, their husbands would practically make slaves of them. If they are unmarried, and are free to leave whenever they choose, they receive much more consideration. In spite of venereal disease, the birth rate is high, but infant mortality is also high. Except in a few favorable localities, Indians over forty-five to fifty years of age are rarely seen. The maternal instinct is almost entirely lacking in the women, and the children are usually cared for by the father when the mother leaves. Desertion by the husband and father is much less common.

The Indians are supposed to be converted to Christianity, but their religion is little more than superstition. They erect crude shrines with wooden crosses on the hilltops near their homes, and make the hard climbs to them as a sort of penance. They often also have small images and crosses erected in the thatch of their houses, as an indication that they have been blessed by the priest and as a protection against disease. The influence of the Church is not as strong now, however, as it was twenty-five years ago. In the old Dos de Mayo tunnel at the Santo Domingo mine there still remains a square niche cut in the rock near the portal where a *Santo* or crucifix used to be hung and candles were kept burning day and night, but nothing of this sort is now required.

Summary

From a mining viewpoint the only possibilities on the eastern slope of the Andes in the district described above are in gold mining. Transportation is too expensive for anything except the precious metals. Quartz veins, although of frequent occurrence, are seldom of size sufficient to warrant development until cheaper transportation is provided. Some of the larger placer deposits may warrant exploitation on a large scale, but their development should be undertaken only by a strong company. A concession is said to have been granted for a railroad to follow approximately the line of the Inca Trail, but it will be many years before it is constructed. Until then those companies that are already established in the country and have power and transportation facilities will have a decided advantage over all others.



A native inn at Limbani

Bauxite Mining Largely by Open-pit Methods

As bauxite prospecting is done largely by examining terrain for outcrops, and the beds lie near the surface, bauxite mining is carried on principally by open-pit methods, says Robert J. Anderson in *The Mining Journal*. The outcrop is usually first worked by hand, until the stripping becomes too heavy, and until the deposit is well opened up. Subsequently, the overburden is removed by steam shovel, drag-line excavator, or horse-drawn scrapers, and the bauxite then taken out by the same means or by hand shovel. Steam-shovel operation is not feasible where the bodies are irregular.

A development of note is that of underground mining started recently at the mine of the American Bauxite Co., Bauxite, Saline County, Ark. The overburden here varies from 25 to 140 ft. in thickness, and for several years has averaged 40 ft. Underground operations were started to overcome the heavy stripping costs. Initial underground operations are to cover an area of 160 acres, under which the ore lies at an average depth of 100 ft. A drainage and haulage tunnel 4,000 ft. long has been driven along the edge of the orebody, and drifts 20 ft. wide are being driven on 50-ft. centers from the main tunnel clear through the orebody, leaving 30-ft. pillars the entire length of the drifts. The retreating caving method is to be used in mining—that is, after the ore has been mined from a drift, the roof and pillars will be pulled from the far end, letting the overburden fall in behind them. Operations at the property are to be gradually changed from a maximum of open-pit mining to a maximum of underground work. Steam-shovel operations are now being conducted at the British and Dutch Guiana mines.

A Peculiar Magazine Explosion at Jerome, Ariz.

By W. V. De Camp
Jerome, Ariz.

THE powder magazine of the United Verde Copper Co., at Jerome, Ariz., exploded between 2:30 and 3 o'clock on the afternoon of Dec. 20, 1925. Smoke was first observed pouring forth from around the electric heater box and the air vents (see sketch) several minutes before the explosion. This fact was reported by workmen standing about 1,500 ft. from the magazine. The volume of smoke reached immense proportions before the explosion took place.

At the time of the explosion, the magazine contained 610 cases of 1⅛ in. x 8 in. 50 per cent gelatin powder and 390 cases of the same size 35 per cent gelatin stick powder, making a total of 1,000 cases of powder, or 50,000 lb. This powder was stored in the magazine the previous day in a frozen condition.

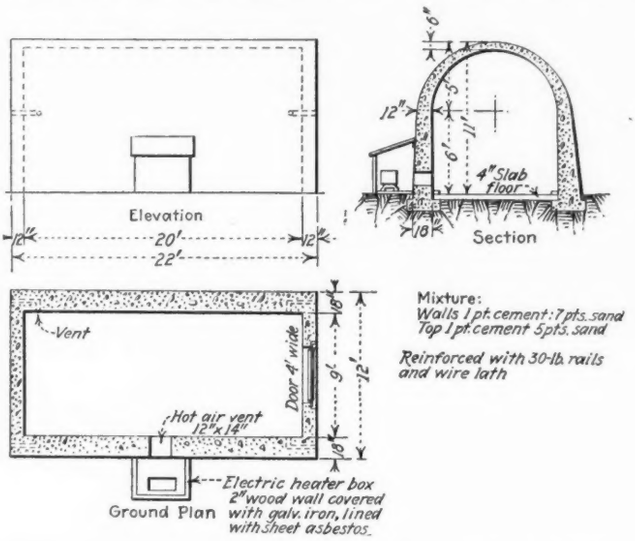
The cause of the fire that preceded the explosion is not definitely known. Workmen had entered the magazine and removed 160 cases of powder about four hours before the explosion. It is considered by most of the men that investigated the explosion that in the magazine, which was filled to capacity with powder, the circulation of air had been reduced, with the probable result that an excessive temperature was built up in the air adjacent to the heater, causing the powder to be set on fire. The electric heater consisted of a series of cast-iron grids set in a small box adjoining the magazine. Cold air vents were placed below the grids to supply a sufficient quantity of air deemed necessary for proper ventilation. No other powder or any other material was in the magazine other than as herein stated, and the magazine was free from rubbish. It is possible that poor circulation was caused by placing powder too close to the heater opening, resulting in a temperature sufficient to ignite the powder cases.

The distance between the magazine that exploded and a similar one near by was 165 ft. In the unexploded magazine about 476 cases of "Apache quarry special" bag powder were stored. The end walls of this magazine were blown out and the arch roof was badly fractured. There was a partial barricade between the magazines, but not a complete one. Both magazines were of the same size and type. The side walls were constructed of 1 part cement to 7 parts sand concrete, no gravel being used, and the arched roof of a 1 to 5 sand cement mixture. Reinforcement consisted of several 30-lb. rails laid across the bottom of the floor and extending part way up the sides to keep the magazine from collapsing.

In addition to the loss of the magazines, the damage consisted of shattered window panes in a small settlement 1,000 to 1,800 ft. distant around a hill from the magazine and 200 ft. lower, and a considerable number of plate glass windows in the town of Jerome, one mile distant. To reach the town of Jerome, the force of the explosion had to travel up over a ridge a few hundred feet higher than the magazine, and from there to an elevation approximately 500 ft. lower than the magazine. The ridge is about one-third of the distance from the magazine to the town. Damage was also done to the window glass at the mine surface plant 600 ft. lower and about three-quarters of a mile from the magazine. The surface plant was also protected by the natural barricade of the ridge behind the magazine.

Two or three persons received minor cuts from falling glass in the settlement near the magazine, but nothing that could be classed as more than superficial. There were probably fifty to sixty persons in this neighborhood at the time of the explosion, consisting mostly of women and children.

The loss due to the explosion will probably be between



Sketch showing structural details of United Verde powder magazine

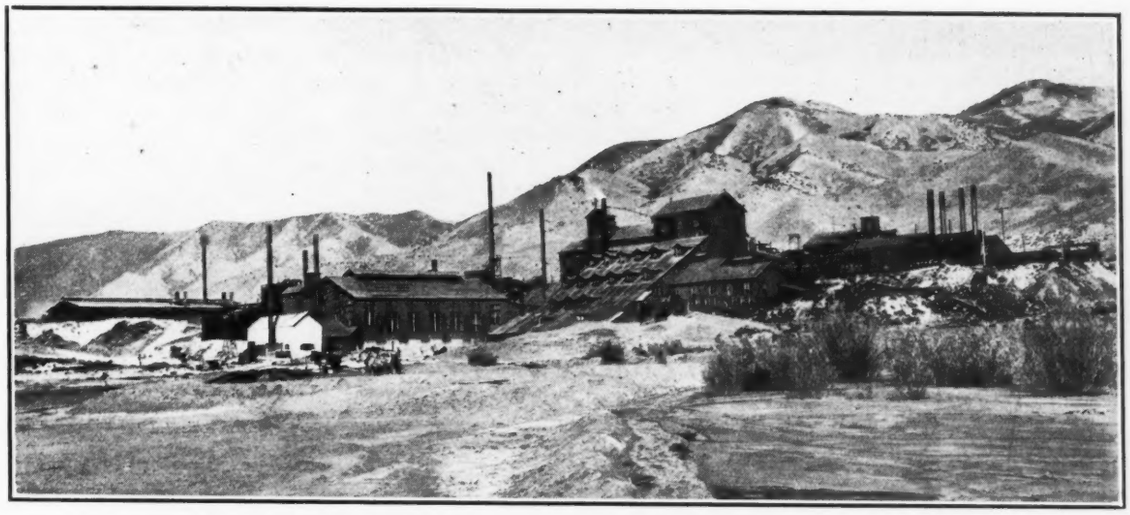
$12,000 and $15,000, which will include the loss of the powder magazines, powder, other damages, and the cost of building another magazine for the storage of powder used on the surface. Judging from the damage done, the location of the magazine was ideal, it being situated in a narrow gulch opening out toward the steam shovel waste dump in such a way that the force of the explosion was directed away from the town and surface plant.

Both magazines, including the heaters, were inspected a year ago by one of the most prominent powder men in the country, and were passed on favorably. In addition, the remaining magazine and heater were inspected by another expert after the explosion, and in his opinion the heaters were not responsible for the fire or the explosion. It is possible that one of three causes may have been responsible for the explosion:

1. Overheating and ignition from heater.
2. Carelessness on the part of the men who took out powder and who may have dropped a lighted cigarette.
3. Rapid change in temperature from frozen condition to 90 deg. F., causing a chemical change in the powder.

In future construction of powder magazines, heat will be supplied by electrically heated water or by placing resistance grids in the path of a current of air produced by a small fan and traveling in a concrete duct, at one point of which it will dip downward and the air pass over a basin of water for the purpose of increasing humidity and eliminating the possibility of a spark reaching the interior of the magazine.

The need for properly locating a magazine of this capacity was evident in this case, since the destruction of property and life would have been great had this magazine been so situated that the force of the explosion was directed toward the town or plant.



General view of the Combined Metals Reduction Co.'s w orks at Bauer, Utah

Selective Flotation at Bauer, Utah

Combined Metals Reduction Co. Has Interesting Small Plant for Treatment of Lead-Zinc Ores

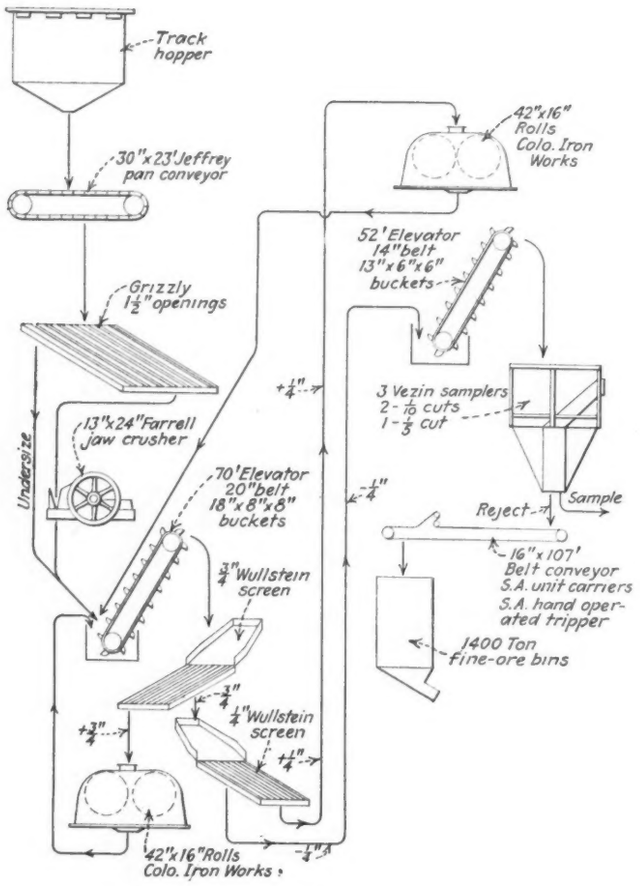
By Edward Hodges Robie
Assistant Editor

THE Salt Lake district, in Utah, is becoming one of the centers of selective flotation in the United States. The most important plant is that of the International Smelting Co. at Tooele, with a daily capacity of 1,000 tons. A new plant now under construction for the United States Smelting, Refining & Mining Co., at Midvale, which will be ready for operation some time this spring, will rank second, with a capacity of 600 tons; heretofore a 60-ton pilot mill has been operated. In the Bingham district, the Utah-Apex Mining Co. has a small plant treating lead-copper ores. At Park City, the Silver King Coalition company has a selective flotation department, the Park-Utah Consolidated has a 50-ton test mill, and the Keystone Mining & Milling Co. has a 150-ton plant. Lead, zinc, and iron call for separation in most of the Park City ores. In the Tintic district, Chief Consolidated has an interesting mill, in addition to its volatilization plant. The largest flotation plants around Salt Lake City are, of course, the Magna and Arthur mills of the Utah Copper Co. Selective flotation is not commonly applied to the milling of straight copper ores, though the advantages of dropping barren iron sulphides as well as the gangue have made practically all flotation processes more or less selective.

All of the plants mentioned were open to visiting engineers at the meeting of the A.I.M.E. held in Salt Lake City last fall, and their operations are fairly well understood. Less has been heard of the Combined Metals Reduction Co.'s treatment plant at Bauer, Utah, so the accompanying flow sheets, indicating the method of treatment of lead-zinc ores by that company, may prove of interest. It is hoped, later, to give more of the details of the operation of this interesting plant. To E. H. Snyder, who is manager, I am indebted for the data here given. Both Mr. Snyder and his assistant, F. P. Merry, were most agreeable hosts at the time of my visit to the property.

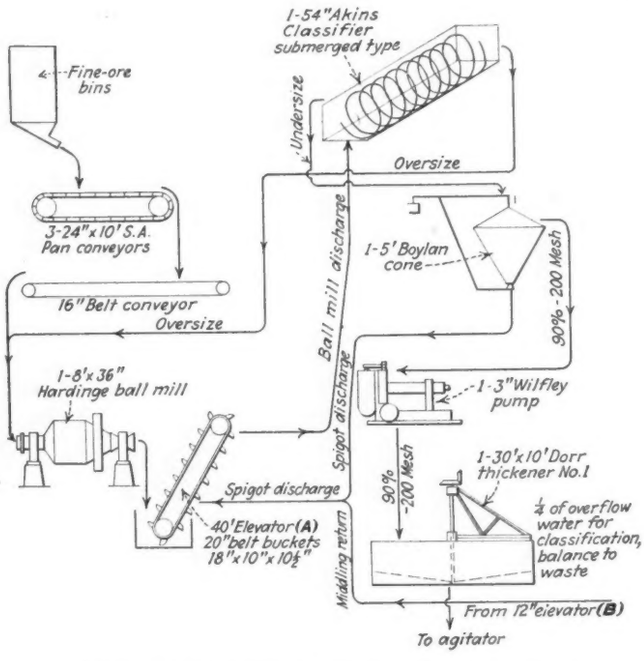
Bauer is situated on the Honerine spur of the Los Angeles & Salt Lake R.R., near Tooele and 40 miles west of Salt Lake City. There is no railroad station—only a sign—the postoffice address of the company being at Stockton. Construction work on the plant was started a little over two years ago, on Nov. 20, 1923, and the flotation section started operation on June 1, 1924, treating 150 tons per day of ore from an allied company at Pioche, Nev. At this time, a strong sulphuric acid circuit was maintained. All of the iron was floated with the lead, and in the tailing from this treatment a separation was made between the zinc and gangue. This resulted in low-grade lead concentrate, but high recoveries of gold, silver, and lead. The ore treated at that time was very uniform and assayed about as follows: Au, 0.035 oz. per ton; Ag, 8 oz.; Pb, 7 per cent; Zn, 15 per cent; and Fe, 15 per cent.

In the fall of 1924, the plant began receiving an additional ore from Pioche of about the following analysis: Au, 0.030 oz.; Ag, 35 oz.; Pb, 6 per cent; Zn, 20 per cent; and Fe, 3 per cent. It was found desirable to treat both of these ores without changing reagents, and to do this to the best advantage a neutral circuit was adopted. This flow sheet worked well until the Honerine mine, at Bauer, began producing mill ore, in January, 1925. Honerine ore received assayed about: Au, 0.03 oz.; Ag, 3.5 oz.; Pb, 6 per cent; Zn, 14 per cent; and Fe, 28 per cent, the chief difference between this and the ore from Pioche being the high iron content of the Honerine ore. This made it necessary to adopt a method that would pass a major portion of this iron to the tailing, so an alkaline circuit was tried, similar to that which has been found useful in efforts to drop iron at other places. Since Feb. 1, 1925, the mill has been operating with an alkaline pulp, which gives a circuit adaptable to all three of the ores received. The accompanying flow sheets are self-explanatory, and show present practice.

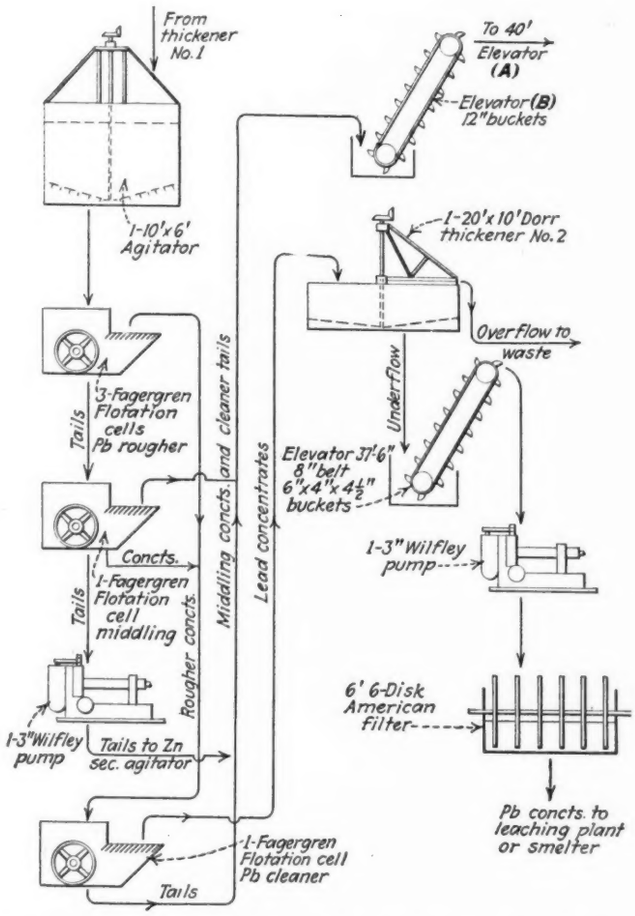


Flow sheet of the crushing section, Bauer plant

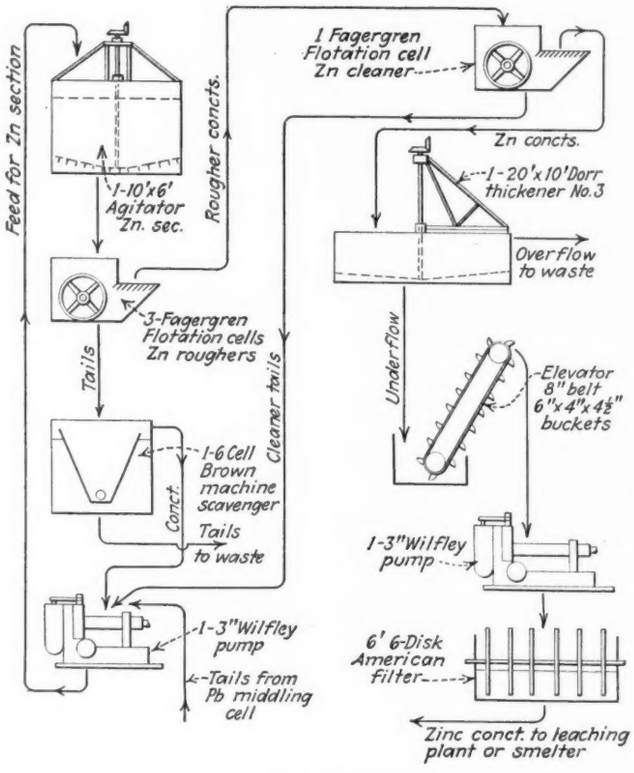
The point of most interest in this flow sheet is the manner of handling the circulating load in the lead circuit. Concentrate from the flotation cell fed with middling, together with the tailing from the lead cleaner cell, is returned to the ball-mill classifier. This serves a double purpose: in the first place, it gives the ball mill another chance at any oversize in the middling



Fine-grinding and classification department



Lead flotation section, showing return of concentrates from middling cell, and tailing from cleaner cell, to ball-mill circuit



Flow sheet of zinc flotation section

product; and, second, it permits the elimination from the circuit of all excess reagents in a very short time, through the overflow of the feed thickener. This second point has proved most valuable, for in the event of an over-conditioned circuit, due perhaps to accidental spilling of oils or reagents, the circuit can be straightened out and the excess reagents eliminated within about one and one-half hours.

Another feature of the flow sheet worth calling attention to is the extreme fineness to which the ore is ground—90 per cent through 200 mesh. The intimate association of the minerals necessitates very fine grinding.

A separate section of the plant is devoted to leaching, but as this process is still in the development stage, no details are available for publication. Outstanding features of the process are: (1) Leaching of finely ground sulphide ores with hot acid brine solution to dissolve lead compounds. This is done without roasting. (2) Cooling solutions to 25 deg. C. to recover lead as a pure chloride. (3) Treating the lead chloride to make refined lead. The company makes its own hydrochloric acid for leaching, from salt and sulphuric acid.

China's Tin Industry

Three Provinces Yield Greater Part of Output—Primitive Methods Used—Refinery Results Judged by Observation

THE chief sources of tin production in China are Yunnan, Kwangsi, and Hunan. These provinces produce annually about 8,000 tons, 600 tons, and 150 to 200 tons in their respective order, according to Philip R. Wolff in the *Far Eastern Review*.

Kochiu is the principal place in Yunnan where tin is mined, the metal being obtained in a very primitive manner, no machinery being employed. In the vicinity is one fairly modern smelting plant, erected by a European firm at a cost of over $1,000,000, but it is reported that the output averages only about 500 tons per annum. The tin is produced in slabs of about 55 catties each (1 catty = 1⅓ lb.) and runs 50 to 90 per cent tin, according to the mine from which it is produced. Practically all the output goes to Hong Kong, where there are about six refineries. The slabs are remelted in open circular saucer-shaped iron pans 39 in. in diameter by 12½ in. deep. In the center of the pan is placed a cylinder 12 in. high, 15 in. diameter, made of ⅛-in. iron, so that at the actual point of contact the cylinder rests on a knife edge only. This, apparently, is a most important factor in the melting process. Wood is used as fuel; some slag from previous melting is left around the cylinder, and the various grades of slab tin are then placed on end also around the cylinder, and as the tin gradually melts, the pure metal finds its way by gravity into the cylinder via the knife edge. From the cylinder the molten liquid is ladled out into either iron or loam molds. The scum on the molten metal outside the cylinder is skimmed off at frequent intervals and removed to separate molds. This slag, which contains as much as 70 per cent of tin, is made into rough bricks and is reserved for further refining with charcoal by forced draft during periods of slackness. The residue from these bricks is called "iron tailings" and contains as much as 30 to 35 per cent tin. These tailings are disposed of in Europe and North China principally, no attempt being made in Kong Kong to recover their tin.

During the melting of the metal, frequent tests are made to ascertain that the standard of purity desired is being maintained. This is done by pouring a little of the molten metal, about the size of a crown, on to a sheet of paper placed on the bottom of an inverted earthenware pot. The "sheen" and the pattern of the surface of the disk so obtained afford the requisite guide for the purity test. Should the charge show signs of falling below the required purity, more slabs of tin of high purity, such as Straits, Banca, or Ho Yuen (Kwangsi) 99.8 per cent to 100 per cent, are added to "sweeten" or improve the quality. The capacity of each refinery, for a working day of sixteen hours, is about twenty-five tons.

The method of arriving at the prices at which the various grades may be sold is based on the prices of the various grades of rough, plus melting charges. These charges depend greatly upon the cost of fuel and vary between $8.20 and $3.50 per picul (1 picul equals 133⅓ lb.)

The tin from Kwangsi and Southern Hunan, being of exceptional purity (sometimes as high as 99.9 per cent), is used principally for "sweetening" the Yunnan tin which is being refined.

In addition to the mined tin a fair quantity is recovered from burnt joss-paper ashes and cigarette and other tinfoil wrappers. No detinning works exist in China.

The refining is in charge of foremen who must have had many years' experience before being entrusted with the work, because upon their acuteness, keen observation, and judgment depend the correct grading of the tin. From long experience and intimate knowledge of the different grades (the percentage of tin in slabs from each Yunnan smelter, whose brand or "chop" is on each slab, being more or less known), these smelters know how much of each grade is necessary to produce refined tin of 96, 98, and 99 per cent, respectively. No assayers or analysts are employed in these refineries, all results being judged solely by observation. The foremen claim that while an analyst may be wrong at times, when analyzing No. 1 grade, they never are. But they admit that occasionally, when they have been overworked, mistakes occur with the No. 3, or 96 per cent grade, more especially when their margin of profit is infinitesimal and they endeavor to cut the percentage too fine to save mixing too much high-grade tin. With the No. 1 they can almost invariably tell, to a decimal point, the purity of the metal they are turning out.

The chief places to which the various grades are exported are as follows:

No. 1 minimum.....99%
No. 2 minimum.....98%
No. 3 minimum.....96%
} to foreign countries, the bulk going to the United States.

"Kap" slabs 99.5%
"Dow" ingots 99.5%
} to Swatow.

"Dow" slabs .....98%—to Amoy and Foochow.

"Kwa Hung" No. 3 pigs, slightly under 96%—to Shanghai and North China.

Refinery Clays Mined in Nevada

Suitable for Bleaching Oils—From One-half to Four Times as Effective as Fuller's Earth, Depending on Grade

By Victor M. Arciniega
Chemist, General Clay Co., Death Valley, California

BLEACHING CLAYS suitable for oil-refinery work are being quarried and shipped by the General Clay Co., of Los Angeles, Calif., from a deposit 10 miles northeast of Death Valley Junction and in Nye County, Nev. The deposits consist of a series of lake beds presumably of Tertiary age. They are classified as sedimentary clays of the lake-bottom type. The beds range in thickness from a few inches to several feet; they strike in a general northeast direction and dip to the east at an angle of 25 deg. Most of them have been tilted by crustal movement. Deposition appears to have been interrupted at intervals. The aggregate thickness of the beds has not been definitely determined, but drill holes in some of the pits have struck clay at a depth of 40 ft.

The clays are essentially a mixture of hydrous aluminum silicates and hydrous magnesium silicates, the latter predominating and invariably underlying the former. The hydrous aluminum silicate clays are soft, friable, earthy, and non-plastic, being brown and gray to dark green in color. They occur from 1 to 5 ft. below an overburden of loose sand and gravel. Physically, they resemble the Montmorillonite clays found in Otay River valley, San Diego County, Calif. The underlying hydrous magnesium silicate clays range from light brown to white and are very porous; they have a specific gravity of 1 to 1½; absorb water readily, and are not plastic. They harden when dried and exhibit a dull luster and a soft velvety feel. Both varieties occur in bedded deposits, lenses, and balls in a white, fine-grained limestone generally at water level.

The clays are quarried in open pits, which are worked downward to a depth of 8 to 12 ft., where the water level is encountered. The pits are then extended as far as clay is found. As the beds are spotted with different grades of clay, it is impracticable to use any excavating machinery. A Fordson tractor and a small gasoline excavator are, however, used, principally for removing overburden. The clays as quarried contain from 30 to 60 per cent moisture and are hauled by Ford trucks to drying platforms, which are constructed of lumber, 20 ft. wide and 280 ft. long, spaced 6 ft. apart and placed 2 ft. above the ground. The clays are dried to 20 per cent moisture by the sun and wind. This takes a day in summer and from three to five days in winter. When air-dried they are hauled to the railroad, 4½ miles away.

Like other clays, these particular clays have undoubtedly many uses, but at present they are being won for the purpose of filtering oils. In this respect they are like fuller's earth. The hydrous aluminum clays are from one-half to one and one-half times as effective as fuller's earth, and the magnesium clays, which are the most abundant, are from two to four times as effective. They are tested and classified, their filtering efficiency being designated by a number which ranges from 0.5 to 4. No acid treatment is used, in contrast with certain clays which are equally effective, but only after acid treatment.

The present enterprise is in its early stages. Clay resources are quite extensive and warrant greater production than that now obtained, which is about 1,000 tons per month. At present operations are limited by the lack of uniformity in the beds and the need for a cheap drying process for use in the winter months. Pit drainage is also a limiting factor.

Germany Increased Potash Production in 1925

Potash production in Germany increased to 1,225,455 metric tons of pure potash in 1925, as compared with 842,060 metric tons in 1924 and 1,110,000 tons in 1913, according to consular advices to the U. S. Department of Commerce. This increase in production is attributable to the recovery of the export trade and the growing use of potash salts by German agriculture. It is reported that development of the export trade is being furthered with the assistance of foreign loans obtained by the Potash Syndicate. German agriculture is the largest consumer of the Syndicate's products, but it is expected that unfavorable financial conditions will cause a decrease in the domestic consumption of potash during 1926, unless an extensive credit system is instituted.

During the last year, the Potash Syndicate has pursued a policy of improving its equipment and centralizing its production in a comparatively small number of plants. Only 90 out of 220 pits are now being worked, but the daily production of each plant has been increased greatly. It is stated in the annual report of the Wintershall Konzern that production costs have been reduced more than 50 per cent by means of concentration. The construction program of this company is almost completed. The plant at Kaiserroda, which is to be finished next summer, will be the largest in Germany. It is estimated that the Konzern alone will be capable of producing 90,000 to 100,000 tons of potash annually.

Colombia's Mineral Resources

An exceedingly healthy sign at present in the economic aspect of Colombia is a marked development of her mineral resources, says *The Statist*, in a short article describing the economic condition of that country, pointing out especially the difficulties of transportation. Naturally, says the writer, only those with ample resources could engage in extensive mining in a country in the present condition of Colombia. As those mineral resources are gradually developed, or, as we hope, rapidly developed, the needs of those developing such resources will themselves create a demand for increased transport facilities. One of the greatest difficulties at present facing Colombia will thus tend to solve itself.

Gold Teeth Still Popular in Russia

In the near future, says the *Russian Review*, the Soviet mint will begin the coinage of gold disks in weights of 5, 10, and 50 grams. These disks will have the Soviet Union's coat of arms on the face, while the reverse side will bear the fineness of the gold, the weight of the disk, and the initials of the master of the mint. The public will utilize these gold disks for various purposes, such as for the preparation of gold caps for the teeth and for ornaments. The gold disks will be quoted on the stock exchanges simultaneously with pure gold ingots.

Useful Operating Ideas

Recording Alkalinity or Acidity of Flotation Pulp

By D. Welge
Consulting Electrical Engineer, San Francisco

In flotation plants treating complex ores it is important to keep a close check of the alkalinity (or acidity) of the pulp in the flotation cell. Soda is added from time to time in the primary cells in such quantities as to give the desired flotation results. When the pulp contains the correct amount of soda it can be checked by determining the conductivity of the solution, which

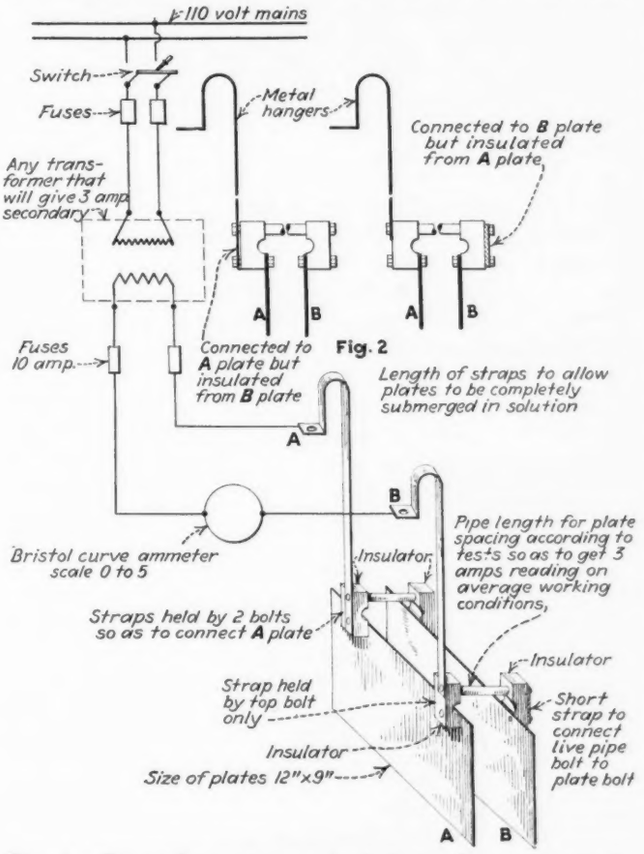

110 volt mains
Switch
Fuses
Metal hangers
Connected to B plate but insulated from A plate
Any transformer that will give 3 amp secondary
A
B
Fuses 10 amp.
Connected to A plate but insulated from B plate
Fig. 2
Length of straps to allow plates to be completely submerged in solution
Bristol curve ammeter scale 0 to 5
Pipe length for plate spacing according to tests so as to get 3 amps reading on average working conditions,
Insulator
Straps held by 2 bolts so as to connect A plate
Strap held by top bolt only
Short strap to connect live pipe bolt to plate bolt
Size of plates 12"x9"

Fig. 1—General arrangement of electrodes and ammeter used in determining the conductivity of a mill pulp. Fig. 2 (above)—Details of electrode construction

is indicated by an amount of electric current recorded on a Bristol or similar ammeter. The general arrangement of the apparatus is shown in Fig. 1.

The plates which are submerged in the flotation cell are of a size and separated from each other so as to give a reading about the center of a 5-amp. scale ammeter chart. This position of the needle will allow a good margin for the swing of the needle according to the variation in the conductivity of the solution in the cell. When too much soda is added the needle will record above 3 amp.; if the current flow as recorded is below 3 amp. more soda should be added. With such chart records the mill foreman can see what has taken place during the night shift or any period when he is absent from the plant. Subordinates have a constant indicator and a record of what has taken place.

It is advisable to install a small 500-w. transformer with separate primary and secondary windings of 110 to 55 volts. Without a transformer the lighting circuit would become grounded through the liquid in the cell and the pipe and other metal equipment in the cell.

The size of the galvanized plates should be about 9x12 in. No. 18 gage. The hanging straps are about $\frac{3}{8}$ by $1\frac{1}{2}$ in. in section; the Bristol ammeter scale 0 to 5 amp. twenty-four-hour chart No. 1406. Ten-ampere fuses should be installed in the primary and secondary circuit. The gap space between the plates has been tried out successfully in one plant and found to be about two inches, but as other plants vary in pulp density the space must be ascertained by experiment to give a 3-amp. reading for normal desired conditions.

Private Records of the Superintendent

By William J. Crocker

One of the mine superintendent's slogans used to be "Lower costs by increasing production." Now, when he is restricted to a certain definite tonnage he cannot make use of this principle; nevertheless, he is rated according to his cost sheet. He must reduce costs, but how? Elaborate mine-accounting systems now in vogue are too complicated to be of much use to the local superintendent. They are all right for filing and as a historical record. The completed cost sheet for the previous month's work reaches the superintendent about the twentieth or twenty-fifth of the month. This is too late to enable him to watch small leaks resulting from his methods. A simple, practical, comparison sheet to be in the superintendent's hands not later than the second of each month is needed. The accompanying example gives the superintendent all the important facts. It is not intended to replace the more elaborate cost sheet, but is to serve as an aid to the local boss. Non-essentials are eliminated. Fixed expenses such as taxes, insurance, legal expense, selling commissions, and other items are omitted as they do not enter into direct production costs. The sheet shown in Fig. 1 has been used for many years. It is an analysis of

Comparison of Costs—Tonnage Basis

	Labor Only			Labor and Supplies		
	Last Month	This Month	Year's Average	Last Month	This Month	Year's Average
General expense	$.....	$.....	$.....	$.....	$.....	$.....
Repairs	.....	.....	.....	.....	.....	.....
Mining ore	.....	.....	.....	.....	.....	.....
Mining rock	.....	.....	.....	.....	.....	.....
Timbering	.....	.....	.....	.....	.....	.....
Bosses	.....	.....	.....	.....	.....	.....
Hoisting	.....	.....	.....	.....	.....	.....
Haulage	.....	.....	.....	.....	.....	.....
Pumping	.....	.....	.....	.....	.....	.....
Landing	.....	.....	.....	.....	.....	.....
Surface	.....	.....	.....	.....	.....	.....
Steam shovel	.....	.....	.....	.....	.....	.....
Total costs	$.....	$.....	$.....	$.....	$.....	$.....

current conditions and is available at a time when effective remedial steps can be undertaken.

Coal, timber, and explosives are the three large supply costs in iron-ore mining; hence the special attention given to them. If electrical power is used, the coal item will be discarded and the peak or demand load may be shown in its place. If demand comes highest at what is known as "the peak hour," and an extra "peak-demand" charge is assessed, some adjustment such as stopping pumps for that hour, stopping compressor, or other power-consuming machinery will adjust the peaks and effect a saving. The column showing "gallons of water pumped saved" proved to be very useful at one time. We had been having quite a long run of pump trouble and were barely able to keep the water out of the mine. When posting his data for the month of April, the clerk noticed that in May of the previous year there was shown almost a million gallons increase in the mine flow. This had been due to the spring thaw. It was more than a 10 per cent increase. The pumps available for duty at the time could not handle the volume of water indicated by the previous year's report. Pumps were requisitioned by wire, and were installed just in time.

Miscellaneous Information

	Labor Only			From Previous Year's Sheet		
	Last Month	This Month	Year's Average	Last Month	This Month	Year's Average
Ore hoisted	.....	.....	.....	.....	.....	.....
Rock hoisted	.....	.....	.....	.....	.....	.....
Total days worked	.....	.....	.....	.....	.....	.....
Tons per man per day-ore	.....	.....	.....	.....	.....	.....
Average days wage, underground	.....	.....	.....	.....	.....	.....
Average wage surface	.....	.....	.....	.....	.....	.....
Payroll average	.....	.....	.....	.....	.....	.....
Tons coal used	.....	.....	.....	.....	.....	.....
Coal in stock	.....	.....	.....	.....	.....	.....
Timber used	.....	.....	.....	.....	.....	.....
Timber stock	.....	.....	.....	.....	.....	.....
40 per cent powder	.....	.....	.....	.....	.....	.....
60 per cent powder	.....	.....	.....	.....	.....	.....
Specials powder	.....	.....	.....	.....	.....	.....
Gallons water pumped per minute	.....	.....	.....	.....	.....	.....
Accidents	.....	.....	.....	.....	.....	.....
Days worked	.....	.....	.....	.....	.....	.....
Days lost	.....	.....	.....	.....	.....	.....

The superintendent found it necessary to go a little more into detail with respect to the relative returns from various working places. The following data are therefore given for every place each month:

Working Place	This Month	Last Month
Tonnage mined	.....	.....
Supply cost	.....	.....
Labor cost	.....	.....
Shifts worked	.....	.....
Tons per man per day	.....	.....
Cost per ton	.....	.....
Rates paid men	.....	.....
Conditions	.....	.....

The foregoing table was designed more to reveal discrepancies such as one drift advancing 46 ft., for 400 tons, another of the same size, same advance, getting, say, 700 tons. Or if one working gang used, or reported using, twice as much timber for the same advance, this fact would appear. Powder used excessively or machine repair involving excessive expense has been detected through the use of this working-place record, which also gives the superintendent a good idea as to which group of men habitually obtain the best results. Any boss who will use this sheet for a year will know which nationality obtains the best results, as far as the particular property in question is concerned.

Mine Time-keeping Methods

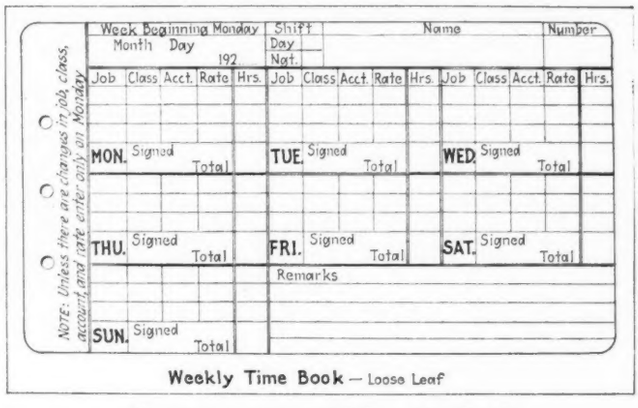
By Frederick T. Rubidge
Mining Engineer, New York

The value of a cost statement depends upon its accuracy, and this accuracy is dependent largely upon men who regard figures as an interfering element in their work. Labor being by far the largest item appearing on the cost statement, it is exceedingly important that labor distribution, or time-keeping, should be recorded in such a way as not only to give accuracy to the cost statement but to call for the least possible mental effort.

Where men are checked in and out of the mine by a timekeeper at the surface the total time of each man is readily recorded, and this would be sufficient if there were no transfers during the day from one class of work to another, involving a charge to a different account. Since, however, such transfers are in most mines a common occurrence, the time-keeping system must permit necessary changes in distribution.

Two systems are in common use for meeting this objective. The one more frequently used is to group the names in the timebook according to the classification of the work, and the other is to give each name a page with provision for recording the distribution of time to the proper accounts, and any change in rate of wage or other details. Under the former method any change in work involving a charge to a different account necessitates the entry of the name in another part of the timebook. To avoid this task the distribution is often neglected. Also, the entering of time on more than one page is likely to lead to errors.

The advantages of the page-to-a-name method are at once apparent, and I believe it would be in more general use if it were not for the fact that the commonly used timebook procurable from the stationery store is not suitable. The form appearing herewith has been found to meet the conditions satisfactorily. It is printed on one side only and covers a period of one week instead of the usual monthly period. This is done to make it of pocketbook size, but there is also the advantage that it accumulates less dirt during its lifetime, which makes for legibility and neatness. It is loose-leaf, so that the past weeks and discarded names can be removed, or if a man is transferred from one boss to another the page may be transferred with him. It begins the week with Monday because shift changes are usually made on that day. Conditions will govern the designation of the first column, "job" being used for the shop timebooks and "place" (working place) for the mine. On the inside of the book cover keys to the account and classification numbers are pasted for reference.



Specimen page of labor timebook

Analysis of the Federal Revenue Act of 1926

Exemptions Increased; Surtax Reduced; Capital Stock Tax Repealed; Mine Discovery Clause More Liberal; Oil-Well Depletion Flat 27½ per Cent in Lieu of Discovery

By Robert Murray Haig
School of Business, Columbia University, New York, N. Y.

NEWSPAPER MEN who observed the ceremony report that as the President signed the Revenue Act of 1926, Mr. Mellon smiled. Suppose you were a Secretary of the Treasury who thought that the rich were being taxed too heavily but found that Congress did not agree with you. Suppose you had incorporated your ideas in a plan of "tax reform" and had appealed to the country over the head of that Congress. Suppose that Congress had bitterly resented this action and had with hauteur refused to accept your plan, finally, passing a law with a maximum surtax of 40 per cent in place of the 25 per cent rate for which you pleaded, accompanying this action with violent attacks upon you, impugning everything from the purity of your motives to your sense of the fitness of things. Suppose you then changed your methods; you announced no plan of your own but modestly indicated a willingness to help Congress in any way within your power. Then suppose that, after the law had been in force only one year, Congress replaced it with a brand new law with a maximum surtax rate of 20 per cent. Do you think that you would be able to keep your face straight as the President signed the bill? Mr. Mellon is not to be criticized for smiling. Anyone but a veteran banker would probably have spoiled the party by laughing till the tears came.

Indeed, there should be enough humor in this episode to supply Mr. Mellon with smiles for the rest of his days. Consider this situation, for example: As will be seen from the accompanying table, the bill came from the House with a rate plan which reduced greatly the taxes on the very small and the very large taxpayers and which reduced only moderately the taxes on those with incomes of from $25,000 to $100,000. The Democrats in the Finance Committee of the Senate took up the budgets for this middle class of taxpayers. Soon they proclaimed the achievement of a great victory. An analysis of this victory shows, however, that they accepted an arrangement under which, to secure an additional reduction of $490 in the tax of the $50,000 a year man, they gave an additional reduction of $700 to the $100,000 a year man and to all other taxpayers with larger incomes. And this was the same crowd which had taken such great pleasure in knifing the Mellon plan!

Amending the Ten Commandments

In December when the bill was under consideration in the House the writer ventured to say: "It seems highly probable that the Senate will change little in the bill except perhaps the rates and that some time in February the new act will go to the President for his signature." Although the President, by signing the bill on Feb. 26, did his part, with two days to spare, the Senate was inconsiderate of the writer's reputation as a prophet. The Senate changes were not few. They were numerous. The Senate changes were too numerous.

Everyone knows, of course, that in times past the House has often sent crude and ill-considered revenue bills to the Senate. Indeed, there have been occasions when everyone assumed that what the House did was of no consequence and that practically the entire bill would be written by the Senate Finance Committee. This year, however, such was certainly not the case. The House Bill, although far from perfect, was a good bill, and it is difficult to say whether on the whole the Senate changes improved it or marred it. Some changes were apparently made for no better reason than to create trading material for the conference. In trying to explain one such Senate change, an exasperated member of the House of Ways and Means Committee remarked to the writer: "The only reason that I can give is that if we sent the Senate the Ten Commandments they would want to amend them." When the bill reached the floor of the Senate, certain amendments were made which were quite preposterous, and which could not hope to be retained in conference. "Go ahead and ruin the bill," shouted Senator Smoot in the midst of the performance. That the bill was not ruined was not the fault of the Senate. It was saved in conference. On the whole, the House emerges with its prestige very materially augmented.

Are the Tax Reductions Over?

The Treasury estimates that the new law will yield $2,365,189,000 during the calendar year 1926, which is $387,811,000 less than the old law would have produced. In 1927 the loss is expected to be less, only $343,000,000. These reductions are so substantial that concern is expressed regarding the adequacy of the yield to meet the government expenses. However, the Treasury estimates in recent years have been so conservative that the leaders in Congress are inclined to take with a grain of salt any gloomy forebodings emanating from the other end of Pennsylvania Avenue. Indeed, some are already suggesting that there are hidden reserves in the estimates which will make possible a pre-election tax reduction in 1928. Much depends, of course, upon the degree of business prosperity experienced during the next few years as well as upon the degree of self-restraint exhibited by Congress in its appropriations. All in all, it seems probable that the Revenue Act of 1926 will prove to be the last of all the great post-war tax reduction measures. Business should plan to adjust itself to a long-time burden of approximately the present proportions.

Opinions as to the wisdom of the present slash in taxation vary widely. Many expect it to have a highly beneficial effect upon the business situation. The newspapers quote a banker as stating that the new law means $387,811,000 additional capital available for investment. Of course, no one can discuss such a point intelligently without making assumptions regarding the purposes for which the money would have been spent, had the reduction not been made. If it were spent for

imposing more narrow limits upon the deductions for depletion and of defining a "proven area" in the cases of gas and oil wells. The Senate Committee on Finance rejected the House proposal and in its report dealt with the problem in the following language:

"The amendment proposed by your committee makes only one basic change in the discovery depletion provision of the existing law so far as such provision relates to mines. It enlarges the present discovery provision in the case of mines by permitting a deduction for discovery value in the case of discoveries of minerals discovered or proven in an existing mine or mining tract after Feb. 28, 1913, not included in any prior valuation.

"The administration of the discovery provision of existing law in the case of oil and gas wells has been very difficult because of the discovery valuation that had to be made in the case of each discovered well. In the interest of simplicity and certainty in administration, your committee recommends that in the case of oil and gas wells the allowance for depletion shall be 25 per cent of the gross income from the property during the taxable year. The provision of the present law limiting this amount to an amount not in excess of 50 per cent of the net income of the taxpayer from the property is retained."

On the floor of the Senate the 25 per cent was increased to 30 per cent. In conference the House secured a reduction of this figure to 27½ per cent. As a result of the various changes, the discovery-depletion section of the new law reads as follows:

Sec. 204(c) The basis upon which depletion, exhaustion, wear and tear, and obsolescence are to be allowed in respect of any property shall be the same as provided in subdivision (a) or (b) for the purpose of determining the gain or loss upon the sale or other disposition of such property, except that—

(1) In the case of mines discovered by the taxpayer after February 28, 1913, the basis for depletion shall be the fair market value of the property at the date of discovery or within thirty days thereafter, if such mines were not acquired as the result of purchase of a proven tract or lease, and if the fair market value of the property is materially disproportionate to the cost. The depletion allowance based on discovery value provided in this paragraph shall not exceed 50 per centum of the net income of the taxpayer (computed without allowance for depletion) from the property upon which the discovery was made, except that in no case shall the depletion allowance be less than it would be if computed without reference to discovery value. Discoveries shall include minerals in commercial quantities contained within a vein or deposit discovered in an existing mine or mining tract by the taxpayer after February 28, 1913, if the vein or deposit thus discovered was not merely the uninterrupted extension of a continuing commercial vein or deposit already known to exist, and if the discovered minerals are of sufficient value and quantity that they could be separately mined and marketed at a profit.

(2) In the case of oil and gas wells the allowance for depletion shall be 27½ per centum of the gross income from the property during the taxable year. Such allowance shall not exceed 50 per centum of the net income of the taxpayer (computed without allowance for depletion) from the property, except that in no case shall the depletion allowance be less than it would be if computed without reference to this paragraph.

In the case of oil and gas wells the allowance is liberal, but it is definite and will greatly facilitate the administration of the complicated discovery provision.

Sections 202(b) (2), which deals with the basis for determining gain or loss, and 206(a) (3), dealing with net losses, were changed to recognize the new percentage basis of depletion.

Africa Supplanting America in Supplying Phosphate to Europe

After the dislocation caused by the war, the phosphate-rock mining industry has been able to regain its pre-war proportions, says *The Economist*, and now appears to be in a position to take advantage of the growing appreciation of the value of fertilizers in cheapening food production, a most important economic factor.

Probably the most interesting development, this writer goes on to say, is occurring in the Moroccan field, which has been opened up only within the last four or five years. There the production of phosphate rock of very high quality more than doubled in 1924, and the output for the past year should prove to be not far short of 700,000 tons. Exploitation of the deposits is in the hands of a capable administration, which is now working on a profitable basis after a considerable capital outlay on up-to-date plant and equipment. It may now be expected that the success of Moroccan product in the world market will stimulate the neighboring producers of Tunisia and Algeria to co-operate with regard to the exploitation of new and valuable deposits situated just within the Algerian frontier. Naturally, with the greatly increased production, competition has sharpened, prices have fallen, and by reasons of high freight charges American rock phosphate, which formerly found a market in Europe, is steadily being supplanted by the North African product. This is illustrative of the general tendency for consuming countries to draw their supplies of phosphate from the nearest source. As the demand increases, new deposits not yet exploited in Russia, Spain, and America will doubtless be opened up to increase the rate of output, which, it is estimated, will amount to about ten million tons per annum by 1930. In addition, the development of the new volatilization process for the production of phosphoric acid direct from rock phosphate on a commercial basis will inevitably result in a more economical use of the raw material that may be required in the fertilizer industry of the future.

Leaching Matte With Nitric Acid —Treatment of Speiss

When finely divided leady copper matte is treated with a slight excess of nitric acid over that required to dissolve the metals, a vigorous reaction takes place and the whole of the copper dissolves, leaving a residue of lead sulphate, antimonic and stannic acids, and sulphur, according to an article abstracted in *Chemistry and Industry* (Sixt; *Chem.-Ztg.*, 1925, 49,943). The solution, which contains a small amount of lead, is adjusted to an acidity of 50 g. of free nitric acid per liter and electrolyzed with a magnetite anode to remove the bulk of the copper. The partly exhausted electrolyte is used for dissolving further quantities of matte after adding fresh nitric acid. If a speiss containing lead, copper, arsenic, antimony, and tin is similarly treated, the solution will contain the copper and lead with most of the arsenic as arsenic acid. The lead may be removed with sulphuric acid with or without a preliminary crystallization of lead nitrate and the copper subsequently precipitated electrolytically. Arsenic acid is removed as it accumulates in the electrolyte by the addition of lime.

new battleships, the effect would be different from what it would be if it were spent for roads and schools. If it were spent for the redemption of Liberty bonds, the amount of capital available for investment might be no greater or no less than it will be with the Revenue Act of 1926 in effect.

General Features of the New Law

The general character of the changes brought about by the new legislation can be grasped from a brief examination of the accompanying table. More than half of the reduction is made in the miscellaneous internal revenue taxes. The net reduction in the income tax is only $164,400,000. The capital stock tax is abolished at a loss of $68,500,000 this year. The estate tax is cut $15,000,000 and the gift tax repealed at a cost of $2,000,000. Taxes on automobiles, trucks, tires, etc., are reduced $82,150,000. Cigar taxes drop $17,000,000. No less than fifteen "nuisance" taxes are entirely swept away, reducing the list of the miscellaneous internal revenue taxes practically to pre-war proportions.

The struggle between the House and the Senate centered about the question of the retention of the federal estate tax. The final decision was in favor of retention (a wise decision in the writer's opinion) but at reduced rates (20 per cent maximum), with an increased exemption ($100,000) and with an increased credit for state estate taxes (80 per cent).

Although the net reduction in the income tax as a whole is only $164,400,000, the cut in the personal income tax alone is no less than $214,075,000, distributed as follows:

Increase in personal exemptions	$42,000,000
Reduction in the normal rates	46,000,000
Increase in the earned income credit	7,000,000
Reduction in surtax rates	119,075,000
Total	$214,075,00

This large decrease in the personal income tax is accompanied by an increase in the corporation income tax. The 12½ per cent rate has been raised to 13 per cent for the year 1925 and to 13½ per cent thereafter to compensate for the loss of revenue due to the abolition of the capital stock tax. This latter tax has been the cause of great complaint. Assessed as it was on the basis of a valuation of the stock, it involved much administrative difficulty and the corporations generally will applaud the change even though it means no reduction in their aggregate taxes.

Changes in the Income Tax

Even if space permitted, it would not be desirable at this place to review in a comprehensive manner the various changes in income tax. The details of the changes of most general interest, such as the reductions in normal rates to 1½, 3, and 5 per cent, the reduction in the surtaxes to a maximum of 20 per cent, the increase in the earned income credit by permitting $20,000 to be considered earned, and the increase in the personal exemptions to $1,500 and $3,500, have been adequately reported in newspaper accounts and are set forth in the income tax blanks with which the reader will be struggling when this article appears. The higher personal exemptions mean that 2,300,000 fewer people will have to struggle this year than last. It may be noted in passing that the increased credit for earned income is a more substantial concession than appears on the surface. Under the old law a man with $20,000 earned income could at the most secure a reduction of $90. Under the new law such a person might secure a reduction of $250.

Aside from these changes, the modifications in the income tax are not numerous, and those which merit comment in a general article are very few indeed. The publicity of tax payments is abolished, the Board of Tax Appeals is strengthened, and a joint committee of five Senators and five Representatives is established to make a study of the revenue system in general. Depreciation actually sustained before March 1, 1913, must be deducted in arriving at the basis from which to measure gain when property was acquired before that date at a cost greater than the value that it had on that date.

The Exemption of Foreign Traders

A new provision of the law and one which is being widely heralded in the newspapers as being wise and just is that which permits an individual citizen of the United States who resides abroad for more than six months of the year to ignore entirely in making up his return "amounts received from sources without the United States, if such amounts constitute earned income. . . ." The case for this amendment rests upon the alleged practice of other countries in refraining from taxing such income. As the situation now stands, however, if the foreign country in which the American trader is residing six months taxes him at a less rate than the federal rate, he is placed in an advantageous position as compared with the American trader at home. Again, even though the foreign country has tax rates as heavy as our own, the trader who is taxed on half of his income abroad and on half of it here, falls in the lower brackets in both countries. This, then, appears to be a subsidy to foreign trade at the expense of domestic trade which is very far from being wise and just.

Retroactive Validation of Treasury Interpretation

Near the very end of the law, among the administrative provisions, appear two innocent looking sections (1207 and 1208) which were inserted at the last moment on the floor of the Senate. In spite of their innocuous appearance, it is not unlikely that these provisions may prove to have far-reaching consequences of a very undesirable character. They are designed, in the case of installment sales and in the case of invested capital computations, to legalize retroactively the interpretation of the law that was made by the Treasury as far back as 1916.

It has been the theory of the federal tax administration that the Treasury shall construe the law strictly in favor of the government and that the taxpayer, if dissatisfied, shall seek redress in the courts. In the cases in point, decisions have recently been handed down by the Board of Tax Appeals and by the courts which hold the Treasury interpretation invalid. The amendments validate them retroactively. In effect, they give notice to taxpayers who disagree with the interpretations of the Treasury, that the Treasury will ultimately be declared to be right even though the courts say it is wrong and that even though the courts grant relief, the relief shall not be given. How any one would have the courage to contest a Treasury ruling under such circumstances is difficult to understand.

It will be recalled that the House bill recast the "discovery value" section of the law with the object of

Gillies' party has completed sampling operations, his crew will be put to work cutting south from Red Lake to Pakwash Lake.

Howey Red Lake Syndicate has comfortable camps, in addition to a blacksmith shop and assay office.

The main zone of the Howey Red Lake has been traced across the McIntyre ground adjoining, into the property controlled by the Red Lake Prospectors Syndicate. H. S. Robinson, chief field engineer for the McIntyre, has completed his examination of the company's holdings and is arranging for a crew to carry on surface work. In addition, two diamond-drill outfits have been ordered for this ground. On the Red Lake Prospectors ground, William Cochenour, one of the original stakers, has a gang of men at work prospecting. Though many parties are in the field staking claims, practically the only real work now in progress is confined to the three above-mentioned properties.

The Dome Mines has a considerable acreage staked in the district and is also understood to have an option on the Howey Red Lake. It is believed that the payment due on the option has been extended, owing to the delay in getting the samples assayed. Practically the entire field force of the Dome, under the direction of their chief geologist, Douglas Wright, has been centered in the Red Lake area.

A local Mining Recorder's office has not been opened up in the district, and several survey parties are at work surveying claims. The government has arranged to have triangulation points established, to which all claims will be tied; this will permit the making of an accurate claim map of the district, which can be later tied in to the meridian.

Platinum Reported in Northwest Territory, Canada

A report by wireless from Fort Smith, Northwest Territory, Canada, states that an important platinum discovery has been made in the vicinity of Caribou Island and extending along the Slave River to Fort Chippewayan, one of the oldest forts in the North. It was discovered by B. W. Dunne, a former Federal Government surveyor. The claims have been recorded in the Federal Government recording office at Fort Smith, which is the nearest one to the discovery.

Realtors May Handle Mining Properties

A movement has been launched by the Department of Mines and Mining of the Sacramento (Calif.) Chamber of Commerce to have the realtors of California list and handle mining properties of merit the same as they dispose of industrial properties and plants. It is claimed by the department that this will result in much greater mineral activity, particularly in the development and utilization of non-metallics and industrial metals, as it will make such properties easy of access to the industries desiring such raw materials. A meeting will soon be held with the local real-estate men to work out the details of the plan.

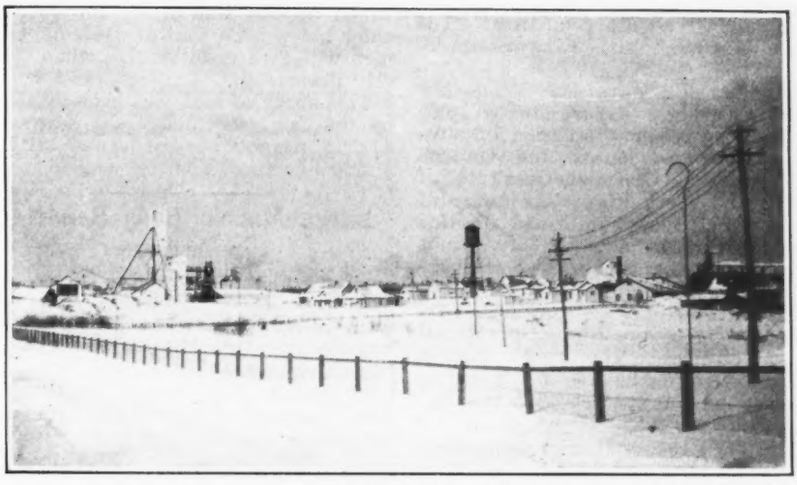
Teck-Hughes Encounters Good Ore and Needs Larger Mill

Developments during the last few months on the Teck-Hughes property, in Kirkland Lake, have been almost of a spectacular nature. These new developments are on the 11th, 12th, and 13th levels, and refer particularly to the south orebody, which apparently apexes just at or below the 10th level. So far a length of 450 ft. has been opened up, with the probability that a total length of close to 700 ft. will be developed. The average width has not yet been determined, but should not be less than 15 ft.

In addition to the south vein, two other veins are known, the main north vein and an intermediate one which appears to be a branch of the north vein and which is found only on the west side of the shaft. The south orebody is almost vertical; the other two veins dip to the south, so that they may come together at some point below the 13th level, at a depth of 1,500 ft.

When the three lower levels are developed the shaft will be continued and diamond drilling at greater depth will be undertaken.

Present developments on the three lower levels indicate that a new mill of greater capacity than the present one will be justified. The present mill is handling 7,000 tons a month.



Teck-Hughes property; new shafthouse at left; mill at right

Quapaw Lease on Sixty Acres Sold for $105,000

John Quapaw, incompetent Indian of Quapaw, Okla., is ahead $105,000 as a result of an auction sale of a sixty-acre tract known as the Ritz lease, at Cardin, Okla., on Feb. 26. The auction was conducted by J. L. Suffecool, Quapaw Indian agent, at his office in Miami. The Kansas Explorations Co. was the purchaser. The occasion marked the first time that property of an incompetent Indian was put up at public auction in the Joplin-Miami district, and the precedent is not looked upon with favor by operators in this field.

Sealed bids were received for the lease once before, but were not deemed acceptable. At the second attempt, sealed bids were asked for again, but with the provision that public bidding would be permitted if anyone wished to pay more than the highest sealed bid. The best sealed bid was $50,000, so bidding started from this figure. There were only two bidders, J. C. Barton, manager of the Kansas Explorations Co., a subsidiary of the St. Joe Lead Co., and Benjamin Marberry, of Farmington, Mo., formerly holder of the first lease on the property. Marberry's last bid was $103,000 and when Barton made it $105,000 he declined to go higher.

The new lease will extend for ten years with privilege of renewal three times, so that it virtually amounts to a lease for forty years. Royalty is to be paid at 12½ per cent. The mine has been worked comparatively little. The last lessee was the Smith-Davis Co., and its mill was destroyed by fire in June, 1925. The company declined to rebuild unless assured of the renewal of the lease.

Objection of mine operators to the method of sale is based on the belief that will cause holders of leases about to expire to "gouge" the cream of the deposits, expecting inability to get the lease renewed without paying a handsome bonus. They believe that in the long run the Indians will not profit by this system of lease selling.

Italy a Large Consumer of American Copper

Italy, already a large consumer of American copper, will come into the market for larger quantities of the metal if the Italian debt funding plan, already approved by the House, is ratified by the Senate, according to men well informed in the metal trade. Ratification would, it is contended, stabilize Italy's affairs and increase its capacity to buy. In 1925, Italy bought $18,200,000 worth of American copper, or approximately 140,000,000 lb., which is more than the annual capacity of the Calumet & Hecla Consolidated mines. Italy has no copper, iron, coal, oil, or cotton of its own. Its two chief resources are hydro-electric power, which it is extensively developing, and man-power. Italy buys the bulk of its copper in the United States, and the fact that it managed to buy, under stringent financial conditions, $18,200,000 worth of American copper last year is held to be evidence of its great need of the metal.

News of the Week

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Summary

PLATINUM reported in Northwest Territory, Canada —Lake Shore on 40 per cent dividend basis— Wright-Hargreaves reduces cost—Diamond drills shipped to Barren Lands east of Fort Fitzgerald, Canada.

Bradley interests to explore Tybo property northeast of Tonopah—California realtors may list and handle mining properties.

A. S. & R. remodeling Durango (Colo.) plant—Molybdenum claims near Climax sold—Old mines in Lincoln Gulch, near Aspen, to be reopened.

London centers interest in the proposed Copper Export Association.

Carson again wins infringement suit in United States district court.

Bureau of Mines devoting special attention to metal mine problems—Idaho Mining Association protests three proposed bills in Congress.

Anaconda files answer to suit filed by Clark, et al— Crystal Copper resumes work after fire—Butte-Ramsdell copper may be acquired by Anaconda.

Labor conditions in Sonora much improved—Italy a large consumer of American copper.

Mason Valley Mines to start 500-ton flotation unit soon—Kay Copper strikes new orebody.

Itasca County, Minn., has 49 mines, employing 3,871 men.

Freeport Sulphur increases production—Quapaw lease sold for $105,000.

Mason Valley Soon to Start 500-Ton Flotation Unit

The Mason Valley Mines Co., with mines near Mason, Nev., and a smelter at Thompson, fifteen miles from the mines, has started crushing ore at its 1,000-ton flotation plant preparatory to starting one of the two 500-ton units. The ore is from its Bluestone mine. No information has been published as to the actual date of starting the smelter, but ore purchases have already been made.

Several Nevada shipments have been received, and since Feb. 19, when the new reduced freight rates from California points to Thompson went into effect, shipments have increased from California mines.

Calumet & Hecla's New Pumps in Tamarack No. 5 Ready Soon

In the Michigan copper district, Calumet & Hecla's new pump system in No. 5 Tamarack shaft will go into operation soon. Water from both the conglomerate and Osceola lode will be pumped through this shaft. With the completion of the pump project, work will be started on the installation of electric hoists in the 81st level haulageway. One will serve No. 4, Calumet, and another No. 7, Hecla. They will hoist rock from the deepest levels to the haulage tunnel.

Calumet & Hecla will tap the Kearsarge lode from No. 4 Hecla shaft, an abandoned unit, by means of a crosscut, east, from the seventh level. The crosscut will be a continuation of one driven to the old boundary before the property of the Laurium Mining Co. was acquired. Opening the Kearsarge vein at this point will provide valuable data for future exploration.

Stampede to Red Lake District, Ontario

Many Claims Staked, but Only Three Properties Under Development—Gold Disseminated in Quartz and Schist

The rush to the Red Lake district continues, and the statement has been made that it will probably be the biggest stampede since the Yukon. Undeterred by the rigors of winter and the hardships of the long trail, hundreds of men are either in or preparing to go in, and in the spring this number will probably be largely increased. The snow motors which were sent in have not been a success and had to be abandoned for dog teams; as a consequence dogs are at a premium and all good dogs in the country as far west as Winnipeg have been bought. Prices as high as $100 to $200 for a single dog and $500 for a four-dog team have been paid. In the spring it is planned to start an airplane service, and heavy supplies will be brought in over the waterways.

Information on the district to date is promising. The veins are found in Keewatin schist and sericite. Pyrite is the most common mineral. Galena and spahlerite occur sparingly, but free gold is usually found associated with them. The gold is not of the jewelry shop variety, but is apparently well distributed in a finely disseminated state, both through the quartz and the schist.

The largest amount of work to date has been done on the ground owned by the Howey Red Lake Syndicate, controlled by Jack Hammill, to whose aggressiveness the speedy opening up of the district is due. Operations are in charge of Alex. Gillies, who was one of the pioneers of the Porcupine district. The Howey Red Lake Syndicate controls one and one-half miles along the strike of the mineralized zone. Work has been confined largely to the westerly end of the property, where the vein has been opened up for a length of 1,000 ft. by twenty-three cross trenches 40 ft. apart. These trenches represent a length of 1,140 ft., mostly dug through 5 to 6 ft. of overburden. In addition 1,200 linear feet of drilling has been done and blasted.

The average width of the mineralized zone is not known, as low ground interferes with carrying the trenches to the limit. Economic values have been found over a width of 42 ft. in one trench, and the next trench shows $11 over a width of 27 ft., while widths of 7 to 12 ft. assay from $50 to $75. Complete assay results are not yet available, as the assay office has been in operation only since Feb. 1. Sufficient information has, however, been obtained to strengthen Mr. Hammill's opinion that the property has all the earmarks of a mine. Three complete diamond-drill outfits have already been shipped, for operation on the syndicate's ground, and the teaming of machinery and supplies necessary for the continuance of operations over the break-up will start early in March, from Hudson. The route to be followed has been decided upon and the road has been completed as far as the Pine Ridge Hudson's Bay post. Between Pine Ridge and Pakwash Lake a gang of Indians is at work cutting the right-of-way, and as soon as Alex.

Washington News

By Paul Wooton

Special Correspondent

Bureau of Mines Devoting Special Attention to Metal Mines

With the purpose of keeping metal-mining matters before his staff, Director Turner of the U. S. Bureau of Mines has initiated a weekly conference, at which he will preside and at which the principal officials and metal specialists will assemble, to discuss current developments and the progress of the Bureau's work.

Instructions also have been issued to prepare films on metal mining. There are only two or three films which deal with metal mining among the large number prepared under the Bureau's auspices. Scenarios are to be prepared as rapidly as possible for "The Story of Copper," "The Story of Iron," "The Story of Gold," and "The Story of Silver."

Arrangements have been made by Director Turner to secure stenographic notes of the recent discussion of electric prospecting, before the Ontario branch of the Canadian Institute of Mining and Metallurgy. As some of those who are best informed on this subject were in attendance, Mr. Turner believes an account of the proceedings will be of wide interest.

The Ontario government has borrowed a copy of the Bureau of Mines' film on silicosis. The Public Health Commissioner of the province recently conferred on the subject with the Bureau's chief surgeon.

Metal-Mine Ventilaton Studies to Be Broadened

An increased amount of work on ventilation in metal mines is to be undertaken by the U. S. Bureau of mines. This will include studies of the extent to which refrigerating machinery can be introduced into deep metal mines. The point has been reached in some of the deeper mines where some facility must be devised to cool the air at the working face.

It is recognized that refrigeration, at best, is subject to very limited use. While it may be possible to use refrigeration machinery to cool certain working places, chief reliance must be placed in securing an abundant flow of air. Studies will be made of friction factors and of losses at bends and of all phases of air movement.

Labor Conditions at Cananea, Mexico, Said to Be Satisfactory

As a result of the labor law of Sonora, Mexico, which provides that a discharged employee shall receive three months' pay upon leaving the service, many mining companies and other industrial enterprises have adopted the "task" or "contract" method. Under this plan the work is apportioned among groups of laborers, who are given their own time in which to perform it. It is stated that this plan works well and that the native laborers much prefer it to the wage system. The responsibility rests with the person or group of persons holding the contract.

Some companies pay bonuses to the contracting forces which perform the best service. Labor conditions in the mines of Cananea are on the whole satisfactory, it is stated by operators. There is less restlessness on the part of the miners than formerly. They are now contented to settle down and establish a home for themselves, instead of roaming from place to place as was the case during the long period of revolutions.

Record Labor Turnover Made by Moctezuma Copper Co.

According to report, the Nacozari mines of the Phelps Dodge Corporation have made a splendid record in promoting co-operation between laborers and employers. For eighteen months the Moctezuma Copper Co. has not discharged a man at Pilares. Every apparent misplacement of a man has resulted in his transfer into the notch in which he fits, and this study of character has proven that all the company's men will give good service when properly placed.

This study of men was brought about by the fact that under the state law a man cannot be discharged without giving him three months' wages.

Large Marble Beds Reported in Arizona

A recent announcement from Los Angeles is to the effect that C. M. Redfern, geologist for the Southern Pacific Railroad, has reported that one of the largest and best marble quarries of the world can be developed in the Dragoon Mountains of Cochise County, Ariz. The marble varies from pure white to dark bluish grey, making it possible to duplicate any of the high-grade foreign marbles. These deposits, could, according to Mr. Redfern, supply all Southern California building demands for marble at a lower cost than that at which the material can be obtained at present.

Navajo Copper Co. May Resume Active Work

Engineers, reported to represent one of the large copper companies, are now making an examination of the property of the Navajo Copper Co., north of Flagstaff, Ariz., accompanied by Charles, David, and William Babbitt, owners of the property. There is said to be a large surface deposit of low-grade copper ore in sandstone formation, but lack of water and transportation has held up development.

A rumor is current that a survey for a railroad into the reservation, in which the deposit lies, is planned to tap the coal, copper, and iron deposits within the reservation.

Hyman-Michaels Co. Purchases Mammoth Smelter

The Hyman-Michaels Co., of Chicago, announces the purchase, through the United Commercial Co., of San Francisco, of the Mammoth, Keystone, and Kennett properties of the United States Smelting, Refining & Mining Co., of Boston, these properties being situated at Kennett, Calif.

Idaho Mining Association Protests Three Proposed Bills Now in Congress

A protest strong and wide is going up from mining districts in the Pacific Northwest against measures said to be brewing in Congress which Western men declare will seriously cripple mining. Three of these bills in particular are obnoxious to mining men—the Stanfield grazing act, the bill proposed by Secretaries Work and Jardine limiting the prospectors' rights to underground development, and the Denison "blue-sky" act.

The Northwest Mining Association has adopted strong resolutions against the bill proposed by the Department of Agriculture which would limit mining on forest reserves to the right of occupancy.

The Idaho Mining Association a few days ago held a meeting of protest at Boise and sent a letter to Senator R. N. Stanfield, of Oregon, urging the defeat of the bill proposed by the Department of Agriculture. "This bill," the letter says, "is detrimental to the development of known mineral zones, a development which should be encouraged by the federal government rather than retarded by this drastic bill."

The objection to the Stanfield grazing act lies in the provision that anyone who has a lease on public lands could fence the area, irrespective of its mineral possibilities.

Kay Copper Co. Reported to Have Made New Ore Strike

Fifteen feet of commercial ore is reported to have been exposed on the 1,500 level of the Kay mine, at Canyon, Ariz. The deposit is chalcopyrite and gray copper. The flow of water in the 1,500 level has materially subsided, so that the new electric pump installed in the mine is handling it running at about 60 per cent capacity. About sixty men are now employed at the Kay.

New Railway Terminal for Sacramento, Calif.

Less than a mile from the spot where General John A. Sutter and a few followers landed on the bank of the American River, on Aug. 12, 1839, to found the first white settlement in the Sacramento Valley, California, a magnificent new passenger terminal of the Southern Pacific company, costing $2,317,077, was formally opened and dedicated Saturday afternoon and evening, Feb. 27. Many prominent officials attended.

President Harold J. McCurry of the Sacramento Chamber of Commerce presided at the formal dedication ceremonies in the evening. The principal speaker was William Sproule, president of the Southern Pacific. The terminal was accepted for the state by Governor F. W. Richardson and for the city by Mayor A. E. Goddard. Connecting the past with the present, a group of the famous "Whiskerinoes" and "Whiskerettes," costumed in the "days of '49," drove up to the station during the afternoon in pioneer rigs and inspected the successor to the old stage depot, from which fifty stages left daily for the mines during the gold rush.

Anaconda Files Answer to Suit Instituted by Clark, et al.

Anaconda Copper Mining Co. has made answer to suit filed against it by the Moulton Mining Co., Clark-Montana Realty Co., Elm Orlu Mining Co., and J. Ross Clark. Defendant enters a general denial to the allegations of the plaintiffs and pleads the statute of limitations as a bar to prosecution of the action. Defendant's answer, which is in the form of a large document, denies specifically various allegations of the plaintiffs, outlining its ownership and describing in detail boundaries of the various claims in the group owned by it and lying to the south of the Poser claim of the plaintiffs. Defendant asserts its ownership of ores found beneath the surface of its property in the Badger and State veins and denies that the Poser and Intermediate veins of the plaintiffs dip to the south and under the Anaconda properties.

Anaconda's attorneys include Henry McAllister, of Denver; John P. Gray, of Coeur d'Alene, Idaho, and L. O. Evans, D. Gay Stivers, D. M. Kelly, J. V. Dwyer, and John A. Groeneveld, of Butte. Attorneys for the plaintiffs are Sydney Sanner, John L. Templeman, Fred Furman, of Butte; John C. Higgins, of Seattle, and William E. Colby.

Joplin Zinc Concentrate Costs $50 per Ton

According to statistics compiled by the Tri-State Zinc and Lead Ore Producers' Association, the average cost of producing a ton of concentrate in the Joplin-Miami district in the month of December, 1925, was $50.51. For November the cost was $48.39. In December the rock-ton mining cost was $2.41, compared with $2.14 in November.

The figures were compiled from statistics furnished by fifty-seven mills in the field that produced 30,574 tons of concentrates during the month.

Actual mechanical and labor cost of production of concentrates was $35.45 per ton, with $6.20 for amortization of capital and $8.78 for royalty.

The following detailed table of rock-ton mining costs was offered by the association for the months of December and November:

	Nov.	Dec.
Labor	$0.99	$1.14
Supplies	0.40	0.38
Liability insurance	0.06	0.07
Explosives	0.18	0.18
Exploration	0.12	0.12
Power	0.18	0.19
Insurance	0.02	0.02
Management	0.08	0.11
Taxes	0.01	0.07
Miscellaneous	0.06	0.09
Totals	$2.14	$2.41

U. S. Circuit Court Upholds Carson Patents

George Campbell Carson was placed in a position by the United States Circuit Court in San Francisco, March 1, to receive damages from the American Smelting and Refining Co. for alleged infringement upon a patent.

Every court into which Carson has brought his case has sustained him, the list including the United States Supreme Court. The company sought to try the case all over again on new grounds, but the Circuit Court said that the book of Carson's legal troubles was closed and that he should be given his due.

The case concerned improvements and refinements in the charging of reverberatory furnaces used for smelting copper ores. The patented process greatly facilitated the work. The smelting companies adopted the process, Carson contended, without giving himself or his patent credit. He demanded satisfaction. They told him that they were using a process patented in Dollar Bay, Mich., to which they had a right.

Carson carried on the fight for nine years without weapons or resources to begin with other than a native simplicity of speech and manner and a few blue prints and etchings. The United States District Court of the State of Washington favored him with an imposing inducement. The Circuit Court upheld the District Court. The Supreme Court upheld the Circuit Court. There are suits pending against other smelting companies, but the case just closed was the key suit.

Venezuela's Petroleum Exportation Record in 1925

THE petroleum exportation of Venezuela in 1925 amounted to 19,022,214 bbl. or 3,727,266 bbl. more than all previous exportation, according to the U. S. Department of Commerce. There was an exportation of 2,540,789 bbl. in December, 1925, which was the largest monthly export from this field since the beginning of operations and which exceeded the November export by 321,548 bbl.

Freeport Sulphur Co. Increases Production

The Freeport Sulphur Co.'s production last year was approximately 400,000 tons, and this will be increased to more than 500,000 tons this year, if present expectations are realized. The sulphur deposit is 900 ft. beneath the surface, and into it 5,000,000 gallons of water of a temperature of 340 deg. are pumped daily. To produce this great supply of superheated water a battery of boilers of an aggregate of 20,000 horsepower is required. The hot water melts the solid sulphur at a temperature of 248 degrees, and in its liquid state the product is forced to the surface and emptied into big vats, where it soon solidifies.

Besides the mine at Freeport the company is opening a new mine at Hoskins' Mound, where during the last three months it has produced sulphur to the value of more than $1,000,000. The Hoskins' Mound property is operated under lease from the Texas Company, which discovered the sulphur while drilling for oil.

The Freeport Asphalt Co., a subsidiary of the Freeport Sulphur Co., is doing a large business manufacturing roofing asphalt. Besides this, it has marketed 750 cars of asphalt for road surfacing in Texas during the last few months.

Crystal Copper Co. Repairs Recent Fire Damage

At the Goldsmith mine of the Crystal Copper Co., in the Walkerville section of Butte, Mont., the wreckage from the surface fire has been removed, and after consulting with H. E. Clement, engineer for the operating company, it was decided to install a temporary electric hoist of 112 hp. capacity. Contract for the hoist has been let to the Butte Machinery Co. Concrete is being poured for the new foundations. Before the end of the year the company plans to install larger equipment and sink the shaft to a depth of 1,500 ft. The present depth is 800 ft.

According to Albert Reimensnider, manager of the Badger Gold Mining & Milling Co., that company will soon pursue developments on several of its claims in the Red Lion mining district near Georgetown, Mont.

New York mining men are sending an engineer to examine the Nero group of claims, owned by John C. Conway, of Boulder, Mont. These claims are northeast of Boulder, the vein on the surface showing commercial lead-zinc-silver values. It is planned to drive a tunnel to tap the ore at a depth of 120 ft. and another adit to tap the body at 500 ft. below the outcropping.

John H. and C. L. Johnson, leasing on the old Garfield property near Basin, Mont., have opened a high-grade deposit of lead-gold-silver ore in one of the old tunnels. Ore assaying over $75 per ton is being sacked for shipment.

Bradley Interests to Explore Tybo Property

The Treadwell-Yukon Co., controlled by the F. W. Bradley interests of San Francisco, now successfully operating a silver-lead mine in the Mayo district, Yukon Territory, has recently acquired an option on the Tybo mine, in the mining district of the same name, about 70 miles northeast of Tonopah, Nev. The property, which has a history running back into the 70's, was reopened by the Louisiana Consolidated Mining Co. in 1917. A power line was constructed from Manhattan and a small concentrating mill and smelter were installed. Operations were conducted in a desultory manner and the company failed. Since 1920, little has been done in the district. In the liquidation proceedings of the Louisiana Consolidated, the assets were acquired by Julius Siegbert, and the Morey Mining Co. was organized to protect interests of various investors.

F. W. Bradley received favorable reports from his engineer who examined the property and offered to take it over from those in control. After no little delay, the terms offered by Bradley were accepted. It is understood that the rehabilitation of the power line, which was stripped some years ago but the poles of which are still standing, is under consideration, and that the two-compartment 400-ft. shaft is to be widened to three compartments and sunk an additional 300 ft. The deposit will be tested out, and, if results justify, a plant for operation will be installed.

Lake Shore Property on 40 Per Cent Dividend Basis

On the Lake Shore property, Ontario, developments on the 800 and 1,000 levels are very satisfactory. A total length of approximately 2,000 ft. has been opened up on the No. 1 vein on the 1,000 level and almost the same distance on the No. 2 vein. The 800 drift west on the No. 2 vein is one of the bonanza levels of the mine. A stope 400 ft. long and 12 ft. wide has been opened up, and values are understood to be $40 to $50. A new crusher installation has been completed on the 800 level, and skips are now being installed in the shaft. Some time in March it is expected that mill tonnage will be raised to between 500 and 550 tons a day and that costs will drop below $6. A recovery of $15 to $16 a ton is anticipated.

Two filters have just been installed in the mill. One will be used on the tailings and the other will take the pulp following the first agitator. This will give a change of solution at this point, which increases the extraction.

A dividend of 10 per cent, payable March 15 to shareholders of record March 1, has been declared. This puts Lake Shore on a 40 per cent a year basis.

The Lake Shore has a splendid bunk house for its miners. The building is two stories high, built of hollow tile at a cost of about $150,000. It is 276 ft. long.

Recording of Deeds Completes Merger of North Butte and Tuolumne

The final act in the consolidation of the Tuolumne Copper and North Butte took place when Daniel Coleman and J. J. Harrington, vice-president and secretary, respectively, of the Tuolumne company, surrendered the deeds covering fourteen claims, machinery, euipment, and surface rights to John Neukom, of Milwaukee, acting for the North Butte Mining Co. The deeds have been recorded in Silver Bow County, Mont., and carried $585 in government stamps, indicating a valuation of $585,000.

Interests affiliated with the merged companies have an option on the "Bluebird" group, in the western part of the Butte district, and may turn these over to the North Butte Mining Co.

Wright-Hargreaves Closes Prosperous Year With Reduced Costs

The annual report on the Wright-Hargreaves property, in Ontario, shows that 147,940 tons were milled, the average recovery being $12.93 a ton and the gross production $1,913,400, compared with $1,088,725 in the preceding year. Net profits, after deducting taxes but before depreciation, were $1,194,000, an increase of almost 100 per cent. Operating costs per ton, not including depreciation or taxes, were $4.74, a decrease of $1.05 from the previous year. Profits amounted to 61 per cent of the gold produced.

A new hoist capable of hoisting from 2,500 feet has been ordered. Additional compressor capacity was recently installed, and the company is now doing more development work. Results on the north vein have been satisfactory, and on the 1,125 level a stope has been opened up for 1,000 ft. and has 300 ft. further to go. On the 1,250 level a vein has been drifted on for a length of 600 ft. and shows the same grade and width. A new mill addition will be constructed which will house the flotation equipment.

The presence of tellurides in Kirkland Lake ore presents serious metallurgical problems. At the Wright-Hargreaves flotation is used and the concentrates are treated by bromocyanide with satisfactory results.

Production of Magnesite in 1925

Statistics from the U. S. Department of Commerce show that the production of crude magnesite mined in the United States in 1925 was 120,660 short tons, valued at $1,432,700. Six operators at seven mines in four counties in California produced 64,600 tons of magnesite, valued at $872,100, all of whom reported only fair business, because of foreign competition. All of the output in Washington was from the mines of one magnesite company, which operated only one of its six furnaces at Chewelah, Stevens County.

Imports of magnesite in 1925 were 4,429 tons crude, valued at $54,593, most of which came from Italy; 17,102 tons of caustic calcined, valued at $414,734, over half of which came from India, and 47,613 tons of dead-burned, valued at $703,074, practically all of which was from Italy.

Revive Lincoln Gulch Mining Properties

The Lincoln Gulch Metal Mining Co., which owns nine mining claims in Lincoln Gulch, twenty miles southeast of Aspen, Colo., is planning to reopen the old mines. Backing the project are J. J. Yeckel, of Denver, president; Al McDonald, vice-president, and E. W. Jewett, of Aspen, secretary. These, with Charles T. Fertig, of Colorado Springs, and George Oxley, of Idaho Springs, constitute the directorate.

Diamond Drill Shipped to Fort Fitzgerald

Excitement has been caused at Edmonton, Alberta, by an order that has been given by Eastern capitalists to the Northern Boat Building Co. for the manufacture of ten specially constructed flat sleds. These are to be turned over to Ryan Brothers, who operate the winter service between Fort McMurray and Fort Fitzgerald, and who have been given a contract to take a diamond-drill outfit and supplies to what is known as the Barren Lands, to the east of Fort Fitzgerald.

No information is being given out, but it is stated that, four years ago, trappers brought mineral samples from this district rich in silver, gold, and lead, the chief value being in silver. Ordinarily, all freighting to Fitzgerald is done by way of the rivers in the summer. The cost of freighting by dog sleds will be heavy. An engineer and an assistant have started by dog sleds for the property. Exact location of the discovery is being kept secret.

Lake Shore headframe and mill

Lake Shore bunkhouse

Craig Mining Co. to Sink 300-Ft. Shaft

The "Brewer" shaft of the Craig Mining Co., situated in the southern part of Butte, Mont., has been unwatered. The shaft is 95 ft. deep, and as the bottom shows ore of commercial value, the shaft will be deepened to the 300 level. At a recent meeting of directors, Charles A. Clark, of Butte, was elected president to succeed Stanley A. Craig, resigned.

M. A. Hewett, of Radersburg; Charles E. Pew, of Helena, and associates have incorporated the Sterling Development Co. and expect to start milling operations at Radersburg, Mont., soon.

Good Ore Reported in Black Rock Shaft

A good body of commercial zinc ore has been encountered in sinking the Black Rock shaft of the Butte & Superior Mining Co. at Butte, Mont. The shaft is being deepened from the 3,100 to the 3,500 level. A dispatch from Norris, Mont., states that a new body of high-grade gold-silver ore has been encountered at the Stirling property, about three miles north of that point. The mine is being operated by George Hadzor and the Moore brothers.

Special Meeting of Butte-Ramsdell Copper Co.

John D. Pope, Henry Meloy, and John A. Henshaw, directors of the Butte-Ramsdell Copper Mining Co., called a special meeting of stockholders for March 3, 1926, in the Hirbour Building, Butte, Mont., for the purpose of considering adoption of a bylaw empowering the directors to sell, lease, mortgage, exchange, or otherwise dispose of any or all of its real property and assets of every kind. The company owns 64 acres near the Colorado mine of the Anaconda Copper Mining Co., last operated in 1919, when the output was about 25 tons per day of copper ore assaying better than 5 per cent and containing over 5 oz. of silver per ton. According to semi-official advices, the propery will be sold or leased to the Anaconda company.

Consolidation of La Plata Mines

Pennsylvania capitalists are backing a syndicate in the consolidation of La Plata mines, near Durango, Colo. Included are the May Day, Idaho, Jumbo, Neglected, and Incas. The May Day is part of the A. E. Reynolds estate, and according to law will be sold by the trustees at public auction on March 29.

Colorado Fuel & Iron Abandons Mine

The Colorado Fuel & Iron Co. has abandoned the Chicago iron mine, situated a few miles around the "hill," near Sunrise, Wyo. It is said that the company has all the ore required much closer and that it is too expensive to ship ore from the Chicago. The Chicago mine is far from being depleted.

Recent Construction in Gold Dredges

A 2½-cu.ft. continuous-bucket dredge of the flume type was recently constructed for the Goldsmith Dredging Co., operating on the Salmon River, Alaska. The dredge is of wooden construction and is equipped with a Diesel engine as the principal power unit. It is designed to dig to a depth of 12 ft. and was constructed by the Yuba Manufacturing Co.

Late in January, 1926, the Yuba Manufacturing Co. also completed and shipped a 5 cu.ft. bucket dredge to Antofagasta, Chile, for the Caracoles Tin Co. of Bolivia. The dredge is of wooden-hull construction designed to dig to a depth of 15 ft. It is equipped with electrically operated machinery, and will be operated upon an alluvial tin deposit.

Itasca County, Minn., Has 49 Mines, Employing 3,871 Men

The County Mine Inspector's report shows that there are in Itasca County, Minn., 49 mines, of which 27 were working in 1925, and 25 shipping iron ore, twelve washing or concentrating plants operated in connection with several of the mines on the western end of the range, constitute an important part of the operations. Underground mining is used in three active properties at Keewatin and one at Nashwauk. Futher west, the mining is all from open pits.

Seven fatal accidents marred the mine operations in Itasca County during 1925. All were in open-pit mining. The total number of men employed was 3,871, in all mine operations. Of this number, 3,071 were employed in open-pit mining, 306 in underground mining, 371 in washing plants, 84 in drilling, 30 in test-pitting, and nine in sinking new shafts. The average wage paid in open pits was $5.14 per day. This is a high average because of the skilled labor employed as locomotive engineers, steam-shovel runners, and the like. The average washing plant wage was $4.40 per day. Test-pitters, whose work is perhaps the most dangerous of any in iron mining, received an average of $6.94 a day.

A. S. & R. Remodels Durango Plant

O. P. Chisholm, assistant superintendent of the American Smelting & Refining Co., is in charge of the work of dismantling part of the old plant at Durango, Colo., the building of new houses, and the placing of new machinery. The work includes the addition of a unit to the roasting department; installing a Dwight & Lloyd machine; installing a reverberating furnace to handle the dross, and building a new plant to take care of byproducts. About $140,000 will be expended. R. P. Reynolds, assistant manager of the Denver office, says that by reason of the new treatment processes Colorado mining is on a sound basis, and he cites the fact that many of the camps that were idle for years are teeming with activity. One of the interesting features is the large amount of capital coming into the state from many large companies interested in the marketing of lead and zinc, in particular.

Good Work in the Lake City Region

James Ramsey and Richard Kilvert, working the Black Crook-Hiwassee mine near Lake City, Colo., up to Feb. 20 shipped three cars of ore. It is said that the selective flotation process overcomes the former rebellious ore.

Molybdenum Mining Claims Sold

O. A. King, president of the State Building and Loan Association of Denver; W. S. Broderick and W. S. Pingrey, owners of twenty molybdenum claims near Climax, Colo., sold them on Feb. 20 to Eastern capitalists (names withheld) who are reported as having paid $300,000 for the property.

Mohawk Working at Full Capacity

Mohawk is the only mine in the Michigan copper district which is virtually at maximum production. The output established in the latter months of 1925 is being maintained, and 1926 results promise to be as good or better than those of last year. Production in 1925 exceeded 16,000,000 lb. of refined copper.

Mohawk is well supplied with underground men, and the force is the most efficient in years. The rich showing continues in No. 6, the main working shaft. In No. 4, ground is being mined in old stopes and drifts between the 21st and 28th levels.

Increased Production from Comstock Merger

January production by the Comstock Merger Mines, Inc., operating at Virginia City, Nev., was larger than for previous months. During February 40,330 tons of ore was milled, of an average value of $4.75 per ton, and gross bullion was valued at $174,563. Of this tonnage, 13,007 tons came from the Middle Mines section and 27,323 tons from the Gold Hill section.

Development into old Crown Point-Belcher stoped areas, on the 1,200-level from the Overman shaft, is progressing satisfactorily and it is believed that a large tonnage of ore, of much better grade than is now being milled, will be found in this vicinity.

Round Mountain Mining Co. Reorganized

At a special stockholders' meeting of the Round Mountain Mining Co., held in Tonopah, Nev., on Feb. 15, a new corporation, the Round Mountain Mines Co., took over all assets of the Round Mountain Mining Co. The new company is a Nevada incorporation with capitalization of 2,000,000 shares, par value 50c., and is assessable. Stock was exchanged on even basis, leaving 560,000 shares in the treasury. The old company will be dissolved.

The lode mine of the company, at Round Mountain, Nev., is reported to be in fine condition. The placer property, which adjoins the lode mine, includes a large area of good gravel, but profits have been impossible in recent years because of scarcity of water for hydraulic operations. Cumulative losses during these dry years have made necessary the new financing.

Mining Lags in Lower California

Mining in the northern part of Lower California decreased considerably in 1925. The gold mines at Alamo and vicinity suspended mining operation and development work. There has been the usual amount of prospecting over a wide area, but no important discoveries have been reported. The onyx mine 200 miles south of Ensenada has been financed again and is operating; it records 2,545 cu.ft. of onyx shipped during the last half of 1925, and claims that an increase is to be expected from now on. There is a possibility that the Alamo mines will be reopened in 1926, according to reports to the U. S. Department of Commerce.

London Letter

By W. A. Doman
Special Correspondent

London Centers Interest in Copper Export Association

London, Feb. 16—Interest in the mining world during the last week or so has been centered on a suggested copper combination. This suggestion apparently emanates from New York, though it has been well taken up on this side. The object seems to be not to limit the output of the different producing companies but to eliminate the middleman. No one interested in the copper-producing business or, in fact, in the marketing of the metal cares to express an opinion, the dealers possibly on account of their business being threatened to a greater or lesser extent, and the producers because they have not yet definitely settled the terms. On various occasions last year I mentioned that American financiers and copper companies were endeavoring to secure an interest in the Katanga copper deposits, making overtures for the purchase of Union Minière shares in Brussels and also endeavoring to acquire Tanganyika shares, the Tanganyika Concessions being largely interested in Union Minière. All the negotiations seem now to have culminated in the proposed combination. From inquiries I learn that whatever may be the result of the proposals—and that there is something in them admits of no doubt—the Union Minière will not agree in any respect to reduce its present or contemplated rate of copper output. Investors in the company and in the Tanganyika Concessions (which was largely responsible for providing the capital) have waited so long for an adequate return, and have been promised so much, that they would not now view with favor any suggestion to limit the output. But the Union Minière is not the only copper producer in Africa, and so far as I can gather many of the Rhodesian copper companies are not immediately affected, because of the fact that the production of the metal at the moment is only on a small scale. Eventually, however, they may be expected to come into any merger that is agreed upon now.

One object that would appear to be behind the suggested combination is the stabilization of the price, for in conversation with mining men I get the impression that the producing companies fancy that they do not receive the best price possible and that they are largely at the mercy of speculators—not necessarily the firms which market the metal.

There has been talk of capital being put into a pool for the purpose of refining the stocks of rough copper at present held in this country and of financing production until market conditions are favorable. No combination in the form of a monopoly would be effective, as copper is produced in many parts of the world, and even were the majority of producers to agree, forcing up the price would be only temporary. People with long memories will have some faint recollection of the Secretan copper combination and its failure some forty years ago.

An important announcement is made by the managing director of the Dolcoath mine (Cornwall). R. Arthur Thomas at the last annual meeting of the company expressed the view that at the end of January the shaft would reach a depth of 1,860 ft. This has not been accomplished, but the lodes that he expected would be intersected have been cut. At about 1,800 ft. a defined lode has been encountered containing some rich tin ore. It is thought that the discovery may be of importance.

Diamonds Form Half of Antwerp's Exports to U. S.

EXPORTS of polished diamonds from Antwerp to the United States during 1925 amounted to $22,979,759 and comprised half of the value of the declared exports to this country from Antwerp for the year, according to the U. S. Department of Commerce.

Despite reports from the trade that diamond exports to the United States are constantly increasing, the declared export statistics show an actual decrease in such shipments to America, which amounted in 1923 to $29,608,656 and in 1924 to $25,037,138. Exports of rough diamonds to the United States increased from 25,133 carats in 1923 to 64,801 in 1925.

Establishment of a Nickel Industry in Greece

A contract concluded Nov. 27, 1925, between the Greek Government and the Middle East Development Corporation, Ltd., of London, was ratified by a legislative decree published in the Official Greek Gazette of Dec. 11. According to the Department of Commerce the contract stipulates that the concessionaire shall proceed within thirty months from its ratification to the establishment in Greece of the necessary installations for the smelting of nickel, the production to amount to at least 500 tons per annum of pure nickel. An immunity from all taxes shall be granted the concessionaire for twenty years, beginning thirty months after the enforcement of the contract, and from all import duties on machines, implements, tools, and building materials for use in the installations during the thirty months.

Precious Metal Exports from Colombia

The total exportation of platinum from the Cartagena district in 1925 amounted to 19,410 oz., valued at $1,684,373, compared with 15,687 oz., valued at $1,490,313, in 1924, an increase of 3,723 oz., valued at $194,060, or about 13 per cent. Exportation of gold in 1925 amounted to 9,252 oz., valued at $178,042, which was 1,473 oz. and $30,193 less than that of the preceding year. According to the U. S. Department of Commerce these exports were to the United States.

Johannesburg Letter

By John Watson
Special Correspondent

Potgietersrust Platinum, Ltd., Controls 180 Square Miles

Johannesburg, Jan. 26—At a meeting of shareholders of the Potgietersrust Platinum, Ltd., held in Johannesburg on Jan. 19, Sir Julius Jeppe, who presided, announced the adoption of four resolutions by which: (a) The Johannesburg Consolidated Investment, the South African Townships, the Anglo-American Corporation, and G. A. E. Becker agreed to subscribe and the P.p. rust company agreed to allot 1,000,000 shares of 5s. each in the company at 10s. per share payable cash against scrip. This motion had been seconded by Sir William van Hulsteyn. (b) The Platinum Company agreed to purchase the cash assets and contracts in respect of the farms Tweefontein No. 1033 and Reitfontein No. 349, district of Potgietersrust, for 2,000,000 shares of 5s. each in the company. This had been seconded by Col. J. D. Anderson. (c) That the chairman and R. B. Saner, or any two of the directors, be authorized to sign such documents as may be required to give effect to the ratification of the agreements. This had been seconded by George Hesse. (d) That the capital of the company be increased to £1,250,000 by the creation of 3,000,000 new shares of 5s. each. This motion had been seconded by J. Andrew Cohen. All four resolutions were unanimously adopted. The company now has a platinum area, approximately 30 miles long by 6 miles wide, upon which Dr. Merensky has reported most favorably.

Osmiridium Recovered as Byproduct

The Witwatersrand Co-operative Smelting Works, near the Robinson Mine, Fordsburg, has for many years been treating auriferous byproducts, mostly of a refractory nature, from the mines. Concentrates, old crucibles (from gold smelting), bricks from pan-furnaces, smelting-room sweepings and "fine iron" (battery-chips and so on) have been sent from the mines to the smelting works, the latter being directed and controlled by a representative committee elected by the mining houses. The presence of osmiridium in certain "black sand," from some of the mines was at one time regarded as a nuisance. A slime dam, adjoining the smelting works, has been under retreatment over Wilfley tables, during the last two years, producing about 30 oz. of osmiridium per month, from about 90 tons of accumulated slime treated.

Hendies Lydenburg Platinum, Ltd., reports the assays of 3.1 dwt. to 28 dwt. of platinum per ton of ore from the Winnaarshoek Farm.

On the Johannesburg Stock Exchange, gold shares have been fairly quiet during the last week. T. C. Lands advanced from 66s. to 70s., closing the week on Saturday at 69s. 6d. (sales ex London). Potgietersrust Platinums, after the increase of capital, were heavily sold from 11s. 9d. down to 11s., closing the week on Saturday at 10s. 10½d. (sales).

Men You Should Know About

Lewis Buckley Stillwell has been re-elected chairman of the Engineering Foundation.

D. E. A. Charlton is now associated with the Highway Lighthouse Co., 100 East 42d St., New York City.

Norman Stines left San Francisco recently on his way to Seattle, from which city he will leave for Nome, Alaska.

L. F. Paddison, mining engineer with the United States Smelting, Refining & Mining Co., is in Nevada on professional work.

Hugh R. Van Wagenen has spent the week March 1 to 6 at Casa-Grande, Ariz., investigating the Greenback mining property and adjacent ground.

N. H. Getchell, manager of the Betty O'Neal Mines, near Battle Mountain, Nev., has returned to Reno from a business trip to San Francisco.

Edward H. Orser, of Swastika, Ont., has just completed the examination of the Abitibi mines property in the Lightning River district of Ontario.

G. C. Bateman, secretary of the Ontario Mining Association, recently addressed the Empire Club, Toronto, on "Mining as a Permanent Industry."

Herbert A. Eye, assistant manager of smelters of the American Smelting & Refining Co. in Mexico, was recently in San Francisco on a brief business trip.

G. M. Ford has been appointed manager of the Dominion Government Assay Office at Vancouver, B. C. During the last year Mr. Ford has been acting manager.

John V. W. Reynders sailed from New York on Feb. 27 on the "Olympic" en route to the Continent on business connected with the American Caucasian manganese ore concession.

Fletcher Wood, manager of the Florence Goldfield Mining Co., operating at Goldfield, Nev., is making examination of the Minnie Moore mine, at Bellevue, Idaho, for New York interests.

L. K. Armstrong, of Spokane, secretary of the Columbia section of the American Institute of Mining and Metallurgical Engineers, recently visited Washington, where he conferred with Secretary Hoover.

J. C. Dick, of Salt Lake City, was a recent caller at the Bureau of Mines in Washington. He urged that the Bureau put more emphasis on the importance of research and investigation of the country's resources of metals.

Stephen Birch, president of Kennecott Copper Corporation, accompanied by **E. T. Stannard,** vice-president of the same company, recently made a visit to the Magma Copper Co., at Superior, and the Ray Consolidated Copper Co. at Ray, Ariz.

Percy E. Barbour, formerly assistant secretary of the American Institute of Mining and Metallurgical Engineers, has become associated with the St. Joseph Lead Co. He will make headquarters in New York, his work being in the exploration department.

Dr. W. T. Thom, chief of the fuel section of the U. S. Geological Survey, recently delivered the first of a series of eight lectures on coal, petroleum, and oil shale to the students in geology at Princeton University, the lectures constituting a part of their regular term work.

S. R. Brown resigned his position as assistant general manager of the San Francisco Mines of Mexico, Ltd., at Parral, Mexico, on March 1. He expects to sail from New York for Antofagasta, Chile, about March 15 on his way to eastern Bolivia, South America, where he has accepted a position.

William H. Kobbé

William H. Kobbé's professional activities in connection with his work for the Texas Gulf Sulphur Co. have been placed on a consulting basis to make possible a broadening of his research and investigations, which will continue to be devoted exclusively to sulphur and its products.

R. S. Botsford, mining engineer, has left Colombia for Paris and London in the interests of the Sociedad de Zancudo, an important gold mine in Colombia, which was discovered in 1793 and has produced since 1851. He will be abroad about a month, after which he will return to New York.

L. C. Penhoel, president of the Southwestern Engineering Corporation, is making an inspection tour to Douglas, Ariz., El Paso, Tex., and Joplin, Mo., where a branch office of the company is maintained. He will also visit the Cabrita mine, at Santa Barbara, Chihuahua, Mexico, which is operated by the company.

Scott Turner, on leaving Canada to go to Washington to begin his duties as Director of the U. S. Bureau of Mines, tendered his resignation as chairman of the Toronto branch of the Canadian Institute of Mining and Metallurgy. The chapter declined to accept the resignation, so Mr. Turner has consented to serve out his term.

Robert N. Bell, who for twelve years served as State Inspector of Mines in Idaho, was on Feb. 12 elected an honorary member of the Idaho Mining Association "as a testimony to his many years of honest, faithful, and efficient service on behalf of the mining industry of Idaho." Mr. Bell is the first man to be accorded this honor.

J. D. Galloway, Provincial Mineralogist for British Columbia, has left Victoria to attend the annual general meeting of the Canadian Institute of Mining and Metallurgy at Montreal. After the meeting Mr. Galloway will go to Ottawa, to confer with the Deputy Minister of Mines with regard to work to be undertaken by the Geological Survey in British Columbia.

Walter Fogleson, Jr., of Deadwood, S. D., has departed for Peru, having accepted a position with the Cerro de Pasco Mining Co. He is a mining engineer. The company in Peru is controlled by the same men as the famous Homestake Mining Company in the Black Hills. A number of former mining men of the Black Hills are now in the employ of the company in Peru.

Walter Douglas, president of the Phelps Dodge Corporation and a director of the Southern Pacific Railway, accompanied by Mrs. Douglas and their three daughters, is making an inspection to the various Arizona properties of the corporation. Mr. Douglas has just finished an inspection of the lines of the Southern Pacific of Mexico.

M. A. Houser, E. H. Todd, A. S. Kilburn, Albert Beck, Alvin Berry and **John Becker,** of Basin, Mont., comprise the board of directors of the newly incorporated Montana-Hydroelectric Co., a subsidiary of the recently organized Montana Smelting & Refining Co. Affiliated interests have formed the Cataract Mining Co. to operate mines in the Basin district. Directors include **M. A. Houser, William Wilson, Robert LeRoy, Sr., Frank Scolberg, Tim Downey,** and **R. H. Tood,** all of Basin.

It is regretted that in our report of the recent A.I.M.E. meeting in New York, the portrait of Colonel Robert I. Rees was accidentally substituted for that of Professor H. Ries.

Obituary

John McRae, one of the pioneer mining men in the Kootenay district of British Columbia, died at his home at Nelson, on Feb. 20, aged eighty-eight.

John Sealy, of Galveston, Tex., chairman of the board of directors of the Magnolia Petroleum Co., died recently in Paris, France.

Edwin Jonathan Warner, aged ninety-two, a resident of Colorado for forty-seven years, died in Denver on Feb. 21. Mr. Warner was born at Hampden, Ohio, and for many years was prominent in the coal and iron industries at Cleveland, Leetonia, and Youngstown, Ohio.

Societies, Addresses, and Reports

Standard Accounting Needed by Oil Industry

J. Edgar Pew, Retiring President, Makes Plea—New Members Named for Board of Councelors—Technical Papers

IN THE INTEREST of the investing public, as well as the members of the petroleum industry, a standard or uniform system of accounting should be formulated for and employed by the members of the industry, said J. Edgar Pew, president of the American Petroleum Institute, at its sixth annual convention at Los Angeles, Calif., recently. Delegates and members to the number of 1,500 or more attended. All elements in the petroleum industries were represented. President Pew called attention to the need for standardization of accounting practice in the oil industry. He pointed out the difficulty of analyzing balance sheets and income statements. Conservative oil companies as a rule charge drilling costs to expense and create adequate reserves for depletion, depreciation, amortization, and replacements. Others capitalize drilling costs and inadequately provide for plant exhaustion. Consequently, in these circumstances, wide discrepancies will be found in the balance sheets and income statements of two oil corporations of equal size and transacting the same volume of business.

The retention of Charles E. Hughes as oil counsel to represent the Petroleum Institute before the Federal Oil Conservation Board was announced by Mr. Pew.

In the absence of Paul Shoup, vice-president of the Southern Pacific Railroad, his address to the Institute on the need for oil conservation through elimination of waste was presented by Earle Derby, one of his associates. Mr. Shoup said: "The only conservation worth while is that of economic efficiency whereby as far as possible unnecessary waste is avoided. Waste is attendant upon all human efforts. No human activity is without waste, but conditions in this direction are becoming continually better. The oil industry can very properly claim credit for much greater economic efficiency than it had a few years ago." Mr. Shoup called attention to the multiplication of service stations, the overextension of drilling, and the unrestricted operation of refineries. In conclusion he admonished the producers and others in the industry to act with conservatism and to avoid overproduction.

Production Group

Pacific Coast—Mark L. Requa, San Francisco.
Rocky Mountain—B. B. Brooks, Consolidated Royalty Oil Co., Casper, Wyo.
Central United States—J. D. Collett, Fort Worth, Tex.; W. C. Franklin, Tidal Oil Co., Tulsa, Okla.; J. Edgar Pew, Sun Oil Co., Dallas, Tex.; Frank Phillips, Phillips Petroleum Co., Bartlesville, Okla.
East United States—J. C. Donnell, Ohio Oil Co., Findlay, Ohio.

Manufacturing Group

Pacific Coast—E. W. Clark, Union Oil Co., Los Angeles.
Rocky Mountain—T. A. Dines, Midwest Refining Co., Denver, Colo.
Central United States—F. A. Pielsticker, Skelly Oil Co., El Dorado, Kan.; P. M. Miskell, Empire Refineries, Inc., Tulsa, Okla.
Eastern United States—Charles L. Suhr, Pennzoll Co., Oil City, Pa.

Distribution Group

Rocky Mountain—E. T. Wilson, Continental Oil Co., Denver, Colo.
Central United States—H. E. Earhart, White Star Refining Co., Detroit, Mich.
Eastern United States—A. P. Coombs, Standard Oil Co. of Ohio, Cleveland, Ohio.

Transportation Group

H. E. Felton, Union Tank Car Co., New York City.

Natural Gas Group

A. B. Macbeth, Midway Gas Co., Los Angeles.

Natural Gas Gasoline Group

D. E. Buchanan, Chestnut & Smith Corp., Tulsa, Okla.

Foreign Trade Group

Far East—Herbert L. Pratt, Standard Oil Co. of New York, New York City.
Mexico and South America—E. L. Doheny, Pan-American Petroleum Co., New York City.

At-Large

J. F. Lucey, Lucey Petroleum Co., Dallas, Tex.
Geo. H. Jones, Standard Oil Co. of New Jersey, New York City.
E. C. Lufkin, Texas Company, New York City.
Thomas A. O'Donnell, California Petroleum Corporation, Los Angeles.
William N. Davis, Mid-Continent Oil & Gas Association, Bartlesville, Okla.
E. B. Reeser, Barnsdall Corporation, New York City.
H. F. Sinclair, Sinclair Consolidated Oil Corporation, New York City.
George S. Davison, Gulf Oil Corporation, Pittsburgh, Pa.
J. W. Van Dyke, Atlantic Refining Co., Philadelphia, Pa.
Henry L. Doherty, Henry L. Doherty & Co., New York City.
Wallace E. Pratt, Humble Oil & Refining Co., Houston, Tex.

New officers were elected as follows: President, W. S. Farish; vice-presidents, E. W. Clark, W. N. Davis, and R. D. Benson; treasurer, Amos L. Beaty; secretary and counsel, R. L. Welch; assistant secretary, W. R. Boyd, Jr.; assistant treasurer, Lacey Walker.

The next convention of the Institute will be held at Tulsa, Okla.

One of the interesting technical papers before the production group was given by R. G. Garrison, who described the drilling of the Miley No. 6 oil well, which reached a depth of 7,591 ft. and was still in oil-bearing formation at that depth. The well was drilled without special equipment and the cost was not excessive. Garrison believes that the day of the 7,500-ft. well is now here, and that such a well can be drilled at reasonable cost by an experienced operator who will buy the best in equipment and will use the best of men.

Other technical papers were "Trend in Electrification in the Petroleum Industry," by H. E. Dralle; "Hild Electric Drive," by Thomas Fleming, Jr., and "The Gas Lift Method of Pumping," by R. P. McLaughlin.

Roddewig New Chairman of Montana Section A.I.M.E.

At the recent annual meeting of the Montana Section of the A.I.M.E., George W. Roddewig, superintendent of the Elm Orlu Mining Co., was elected president; John Stamfield, of the Montana School of Mines, vice-president; Alex McDonald, secretary; and Hugh Maguire and Alex. Leggatt, trustees for the ensuing year.

Dr. C. H. Clapp, president of Montana University, addressed the gathering on "International Control of Minerals," citing the successful methods employed by this country in supplying and distributing minerals during the World War. He advocated the open-door policy among nations.

William B. Daly, manager of mines of the Anaconda Copper Mining Co., spoke on "Organization," his address also covering the human factor in handling men. Mr. Daly's organizing ability and his successful method of keeping in close touch with practically every man on the payroll are well known. He divided a mining enterprise into sixteen departments and outlined the functions and *modus operandi* of each department, comparing present organization and methods with those in vogue a number of years ago. In closing, Mr. Daly said:

"You can get production through driving men. You can get it through fear and intimidation. Such methods will produce results, but I ask you to compare the results obtained in that way with those obtained through co-operation, just treatment, and comradely regard—through co-operation between the management and the men.

"I have heard it said that 'familiarity breeds contempt' and that there are some who will presume on kindness and take advantage of it; but there is a difference between familiarity and kindness. It is possible to show a keen interest and a kindly regard for the interest of the workers, to interest oneself in their grievances and see that justice is done, without exposing oneself to the possibility of having such consideration abused."

San Francisco Institute Section Entertain and Is Entertained

The San Francisco Section of the A.I.M.E. of Feb. 17 joined the Women's Auxiliary in a dinner and entertainment at the Engineers Club. Professor Weeks, of the mining department of the University of California, ably assisted by local members of the Bureau of Mines, staged a highly realistic first-aid exhibition with appropriate make-up. After this bit of well-appreciated foolishness, T. A. Rickard, as master of ceremonies, introduced the remainder of the program. Mrs. T. A. Rickard's songs were skillfully rendered, and her accompanist, Mrs. Grace Jones, ably assisted to make the evening a contrast with the usual meeting. T. A. Rickard finished the program with an account of the wild life he had observed on his trip through Africa. He climaxed his account with a blood-curdling description of the man-eaters of Tsavo.

New Machinery and Inventions

Anaconda Buys New Electric Hoists

Include Some of Largest Yet Constructed—Interesting Features Embodied in Design—Safety Devices Unusual

SIX new electric hoists, three of which will be among the largest ever made, are to be installed by the Anaconda Copper Mining Co. in connection with the extension of three of its Butte mines to a depth of 5,000 ft. This company is now mining ore to a maximum depth of 3,200 ft. It is probable that seven additional mines will be extended to this depth later.

The three mines to be equipped with new hoists will be those known as the Badger State, the Mountain Consolidated, and the Belmont. Each shaft will be equipped with two hoists, one a main ore hoist and the other an auxiliary hoist. Hoist equipment for two of the shafts will be furnished by the General Electric Co. and the Nordberg Manufacturing Co., while the third shaft will be equipped by the Allis-Chalmers Manufacturing Co.

A review of the G. E.-Nordberg equipment shows a number of interesting features. The two main hoists involved will be designed to operate from a maximum depth of 5,200 ft. with skips normally operating in balance. The weight of ore handled per trip in the skip will be normally seven tons and the maximum rope speed, 2,250 ft. per minute.

Each of these two hoists will consist of a double-clutched drum, 12 ft. in diameter, and driven by a direct-current motor having a normal continuous rating of 2,150 hp. at 59.5 r.p.m. and with a temperature rise not exceeding 40 deg. C. This motor will be direct-connected to the drums through a solid coupling.

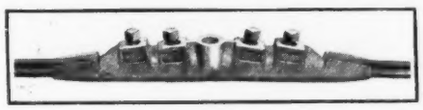
Ward Leonard control will be used. The motor generators furnishing the direct current will consist of 2,300-kva., 514-r.p.m., 2,200-volt synchronous motors, 1,650-kw., 750-volt (maximum) d.c. generators, and 63-kw. exciters. The hoists will be manually controlled through a master switch controlling the voltage from the generator. Safety features will also be provided.

Each of the auxiliary hoists will be operated by similar electrical equipment, each hoist motor having a normal continuous rating of 1,050 hp. at 59.5 r.p.m. and with a temperature rise not exceeding 40 deg. C. The same method of control will be used on these as on the main hoists. Instead, however, of using skips, the auxiliary hoists will use three-deck cages, each capable of holding a 900-lb. car containing 1,800 lb. of ore or rock. The maximum rope speed will be 1,500 ft. per minute. A single 8-ft. drum will be used.

The main hoist motors will be among the largest in physical dimensions ever built, being practically the same size as that installed at the Inspiration Consolidated Copper Co., Miami, Ariz., which is the largest single-motor hoist in the United States.

Saves Time in Splicing

Trolley lines have a way of failing at inopportune moments. In the accompanying illustration is shown the type SL bronze, set-screw splicer as recently developed by the Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa. This splicer permits repairs to the trolley wire to be made in a minimum of time, thus saving both direct and indirect losses, the latter frequently far overshadowing the first in magnitude. The approach lips point upward, forming a firm yet gentle underrun. The wires may be inserted without bending and each is held firmly in place by two set screws.



Firm grip is assured by this splicer

In this 10-in. splicer which accommodates all sizes and cross sections of trolley wire, the four set screws hold the two ends of the wire firmly. The greater the tension on the wires, the tighter will the set screws bind.

These set screws are inserted in a slanting direction and are mounted in square nuts that are capable of rocking. Each nut thus acts like the fulcrum of a pinch bar to which the set screw forms the active end. As soon as tension is applied the set screws wedge tight and take hold of the wire so that it cannot slip. This splicer is 10 in. long and one size will accommodate all trolley wires from 1/0 to 4/0 round, grooved or of figure-8 section.

Governor Control Used in New High-speed Jack

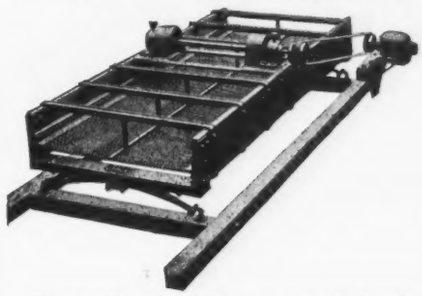
The outstanding feature of a new line of self-lowering jacks introduced by the Duff Manufacturing Co., Pittsburgh, Pa., is governor control. This assures perfect control of the lowering speed, eliminating all possibility of accidents through sudden or uneven dropping of the load, according to the maker. The jack may be slowed down gradually, or stopped instantly at any point without shock or any strain whatever on the mechanism. This control assures uniform lowering when two or more jacks are used under the same load, such as a locomotive or a railroad car. The capacity of these jacks ranges from 15 to 50 tons, the weight ranging from 150 to 290 lb.

Several other advantages are claimed for this new jack. The feature of governor control is covered by exclusive patents.

Light Weight and Strength Feature This Screen

A vibrating screen that is new to the metal-mining field is that of the Universal Vibrating Screen Co., of Racine, Wis. This screen, the makers claim, is very efficient in handling either wet or dry materials 1¼-in. in size to 30 mesh. The Type C screen is shown in the accompanying cut.

In construction the screen is very strong, being built of steel and oak. This gives the necessary light weight and the great strength required to withstand hard use. All wear from material passing over the screen is suffered by the steel side members. The upper frame is supported on special springs at centrally located points at the end of the frame. The makers claim that this two-point suspension feature is very essential, as it tends to equalize the load or feed to screen, so as to keep the vibratory action at an equal intensity over the entire screening area regardless of whether material is fed evenly at the upper end of screen or not. The distance between the screen cloth supports is comparatively short, to eliminate all possibility of dead areas. Additional vibration is transmitted directly to center of cloth where most needed.



Strength and lightness are claimed for this screen

The vibrating mechanism is simple. It consists of a shaft on which two off-center weights are mounted, and which is rotated at a speed of 1,800 r.p.m. Specially designed dust-proof housings are used for the self-aligning ball bearings, and it is claimed by the makers, all parts of the assembly are 100 per cent oversize, to insure continuous and trouble-proof service. The power requirement is a little over ¾ hp.

The Type C screen, using screen cloth 3 ft. wide and 8 ft. long, is said to meet nearly all requirements. Special sizes are built, however, among which is the Type F vibrator, using either perforated plate or heavy wire cloth, 4 ft. 8 in. wide by 6 ft. long. This latter type has been designed especially for handling large quantities of fairly dry material, and is essentially a heavy-duty screen. The vibrating mechanism is mounted directly beneath the screening surface, where it is thoroughly protected by steel plates from wear of material passing through the screen, and there are no obstructions to the flow of material.

These screens can be driven from shafting in the plant or by individual motors. The weight of the Type C screen, without motor, is 735 lb., and of the special Type F is 1,050 lb.

The Market Report

Metal Markets Lower and Badly Mixed

Prices Erratic, but Volume of Week's Business Fair—Lead at 8.50c. in St. Louis and 8.75c. in New York

New York, March 3, 1926—The demoralization in the New York stock market and the severe decline of metal prices in London both contributed to the weakness shown by metal markets in New York during the week ending today. In spite of this, a good business has been done in copper. Buying of lead has been decidedly limited since Saturday, and activity in zinc is confined largely to dealers. Prices have been mixed, those obtained by different sellers on the same day varying widely. Two views of the collapse of the New York stock market are held. One is that prices generally were unjustifiably high and that a break was due because of this technical weakness. If this is the situation, the effect on metal markets should be only temporary. Another view is that many financial leaders foresee some depression in industrial activity during the next six months. This would probably be reflected in decreased buying of metals and lower prices. The observations of different metal sellers drawn from the volume and character of inquiries likewise are divergent; some detect a definite slowing down and others the contrary. In any event, buyers are mostly out of the market at the moment and are purchasing only what they need for current requirements. An exception may be made in the case of a few very large consumers of copper.

Daily Prices of Metals

Feb. Mar.	Copper N. Y. net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N.Y.	St. L.	St. L.
25	13.975	63.00	64.00	9.00	8.775	7.65
26	13.95	63.50	64.50	9.00	8.775	7.475@7.50
27	13.925	63.25	64.25	9.00	8.75	7.45
1	13.925	63.75	64.75	8.90	8.70	7.40@7.45
2	13.875	63.125	64.00	8.85@8.90	8.55	7.325
3	13.875	62.875	63.75	8.75	8.50	7.325–7.375
Av.	13.921	63.250	64.208	8.921	8.675	7.448

*The prices correspond to the following quotations for copper delivered: Feb. 25, 14.225c.; 26th, 14.20c.; 27th, March 1st, 14.175c.; 2d and 3d, 14.125c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

London

Feb. Mar.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3M		Spot	3M	Spot	3M	Spot	3M
25	59 1/4	60 1/4	66 1/2	291	281 1/4	33 5/8	33 3/4	35 1/2	35 5/8
26	59 1/8	60 1/8	66	293 1/2	282 1/2	33 1/2	33 5/8	35 3/8	35 1/2
1	58 3/4	59 7/8	65 3/4	295 3/4	285 3/4	33 1/16	33 1/4	35	35 1/16
2	58 3/8	59 3/8	65 1/4	294 3/8	284 1/2	32 1/4	32 5/16	34 3/4	34 13/16
3	58 5/8	59 5/8	65 1/4	292 1/2	282 1/2	32 1/8	32 3/8	34 7/8	34 7/8

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

Feb.	Sterling Exchange "Checks"	Silver		Gold London	Mar.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
25	4.85 5/8	66 5/8	30 3/4	84s11 1/2d	1	4.85 1/2	66 1/4	30 9/16	84s11 1/2d
26	4.85 5/8	66 1/4	30 9/16	84s11 1/2d	2	4.85 1/8	66 1/4	30 9/16	84s11d
27	4.85 5/8	66 1/4	30 9/16	.....	3	4.85 1/2	65 3/4	30 3/8	84s10 1/2d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command three-eighths cent premium.

Average Metal Prices for February, 1926

Copper:	
New York Electrolytic	13.999
London Standard Spot	59.669
London Electrolytic Spot	66.375
Lead:	
New York	9.154
St. Louis	8.991
London Spot	33.903
London Forward	33.903
Silver:	
New York	66.773
London	30.797
Sterling exchange	485.852
Zinc:	
St. Louis	7.759
London Spot	36.053
London Forward	35.956
Tin:	
99 per cent	62.653
Straits	63.705
London	287.107
Quicksilver	87.580
Antimony	21.676
Platinum:	
Refined	113.909
Crude	108.341
Aluminum, 98 per cent	27.000

Copper At 14.125c. Delivered

Copper prices during the week have ranged from 14.375c. for good tonnages in the Middle West to 14.075c. for smaller amounts in the East. Until Saturday the prevailing price was 14.25c., since which time most of the business has been done at 14.125c. That figure was realized on good sales today. It is believed that a large volume of business would develop at 14c., but producers are disinclined to meet this price, especially in view of the bearish factors in the stock market situation, which they hope are temporary. A net decline of £1 5s. for electrolytic in London reflects the weakness abroad. London will buy f.a.s. copper at 14c. per lb. So far as consumption is concerned, wire drawers are said to be active, and good automobile manufacturing business in Detroit is a strong factor.

Lead Breaks Badly

A decline of £1 10s. in the London market for spot lead contributed to the decline in the domestic market. The American Smelting & Refining Co. on Feb. 25 reduced its official contract

price for New York lead from 9.15c. to 9c. per lb.; on March 1 it made a further cut of 10 points, and today of 15 points, thus bringing the price to 8.75c. The leading interest in the West likewise brought its price down, and on Tuesday stepped ahead of the Smelting company and quoted 8.50c., at which figure several large sales were made. Corroding grades continue to command the usual premium of 10c. to 15c. per 100 lb. As with most of the other metals, buyers are content to buy for immediate needs only, speculating on a further recession rather than an increase in the next few months. The two lines of users that seem to be normally active are makers of lead-covered cables and of lead foil. A visible slacking in the paint industry and to a less extent in the storage-battery industry is reported by sellers. For the most part, producers are in a comfortable position with respect to supplies, but at the same time there is no shortage of metal for prompt delivery. London of course is still so low that ore lead is attracted to the domestic market.

Zinc Shares General Decline

Since last Saturday, consuming business in zinc has been conspicuous by its absence. Dealers, however, have been in the market, and today there has been a slight upward reaction, though the price is off 30 points from that of last Thursday. Consuming activity, though somewhat depressed, is far in excess of current sales. Zinc ore in Joplin is at $50 Prime Western 60 per cent basis, compared with $49, the low level to which it sagged last week. Curtailment of mine production, howexpected in most quarters. Brass Special is again commanding a 10c. premium and High Grade is selling at 9.25c. per lb. delivered in New York.

Tin Fairly Steady

Straits Tin has remained fairly steady during the week at close to 64c. per pound, with forward positions at prices about one cent off this figure. The American market is considerably below London parity, presumably because of profit taking by important domestic dealers. London has purchased tin in this market during the last few days. Statistics show a decrease of 548 tons in the world's visible supply during February, the total being 16,239 tons, compared with 23,591 tons a year ago. Some material reduction in the output from the Malay States in March is expected, and this has been a disturbing factor in the market.

Sterling Exchange Easier

Francs improved somewhat during the last week, whereas sterling is slightly easier, the decline being attributed to lower money rates in London. Closing cable quotations on Tuesday, March 2, for the principal foreign exchanges were: francs, 3.69c.; lira, 4.01c.; and marks, 23.81c. Canadian dollars are quoted at ½ per cent discount.

Silver Still Lower

Continued sales by China in London, combined with little buying interest in New York and San Francisco, caused a further recession in price, and new low quotations for the year were established both locally and abroad on March 3. Although producers are tending to withhold supplies on the decline, there is no bidding up on account of scant offerings, and conditions appear to favor the buyers at present. The market is generally apathetic.

Mexican Dollars: Feb. 25th, 51⅛c.; 26th and 27th and March 1st and 2d, 51c.; 3d, 50⅝c.

Zinc Ore Higher—Lead Lower

Joplin, Mo., Feb. 27, 1926

Zinc Blende	Per Ton
High	$57.90
Premium blende, basis 60 per cent zinc	$51.00@$52.00
Prime Western, basis 60 per cent zinc	$50.00
Fines and slimes, basis 60 per cent zinc	$49.00@$46.00
Average settling price, all zinc	$52.60
Galena	
High	$119.10
Basis 80 per cent lead	$115.00
Average settling price, all lead	$118.62

Shipments for the week: Blende. 16,662; calamine, 43; lead, 3,190 tons. Value, all ores the week, $1,266,660.

Shipments two months: Blende, 154,099; calamine, 84; lead, 22,966 tons. Value, all ores two months, $11,110,420.

Purchases were made by three different individuals for corporations exporting zinc concentrates, a total variously reported at 3,000 to 5,000 tons. Following the spreading of this information, prices were immediately advanced $1 per ton by purchasers for domestic smelters.

The total production of zinc blende this year is 153,870 and the shipment 154,100 tons, a net decrease of stock in the bins this year of 240 tons. The total stock in bins, sold and unsold, is less than one week's output, and as a part of the ore is still unsold it is evident some producers have contracted ahead of production.

It is reported locally that the Federal M. & S. Co. will, beginning next week, reduce its output one-fifth, expecting a decided falling off in demand, the smelters having shipped enough concentrate this year to carry on for several weeks.

Several companies disposed of lead holdings last week, causing a lighter demand and a decline in the price of $2.50 per ton this week.

Platteville, Wis., Feb. 27, 1926

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc	$51.50
Lead Ore	
Lead, basis 80 per cent lead	$117.50

Shipments for the week: Blende, 1,169 tons; lead, none. Shipments for the year: Blende, 7,781; lead, 220 tons. Shipments for the week to separating plants, 2,057 tons blende.

Steel Market Strong—Pig Iron Quiet—Coke Dull

Pittsburgh, March 2, 1926

Freight-car buying has averaged about 12,000 cars a month since Nov. 1, after five months of light inquiry, and the filling of the orders is proceeding slowly.

Mills are trying hard to stiffen prices in plates, bars and sheets. The minimum on plates has risen from 1.80c. to 1.85c., bars are commanding 2.10c. on relatively small lots, and shading of regular sheet prices is much less widespread.

Pig Iron. — The market continues quiet, with prices unchanged from the level reached early in November; Bessemer, $21; basic, $20; foundry, $20.50, f.o.b. Valley furnaces.

Connellsville Coke. — Standard furnace coke is available at $3.25, with little blast furnace inquiry. Eastern demand has not revived to any extent. Foundry coke is again freely offered and is quotable at $4.50@$5. Production of coke is decreasing, but not rapidly enough to forestall an accumulation.

Other Metals

Quotations cover large wholesale lots, f.o.b. New York, unless otherwise specified.

Aluminum—99 per cent, 28c. per lb.; 98 per cent, 27c. London, 98 per cent, £118 long ton. Domestic demand good. Fair business in Great Britain. Norwegian production well maintained.

Antimony — Per pound, New York, duty paid: Chinese brands, spot, 21¼@20⅜c.; April arrival, 20¼@20½c. Cookson's "C" grade, spot, 23¾c. Market entirely nominal. Little activity has been shown in this market since the first of the year. The price has weakened lately on offers of small holders who wish to liquidate.

Chinese needle, lump, 15@16c. Standard powdered needle, 200 mesh, 19½@20c. White oxide, Chinese, 99 per cent Sb_2O_3, 19@19½c.

Bismuth—$2.70@$2.75 per lb. in ton lots. London, 10s.

Cadmium—60c. per lb. London, 2s. 2d. for American metal; 1s. 9d. for Australian metal.

Cobalt—Shot, 96@98 per cent, $2.50 per lb. Black oxide, 70 per cent, $2.20; gray oxide, 75 per cent, $2.35. London, 10s. for metal; 8s. for black oxide; 8s. 10d. for gray. Market quieter. Union Minière production may be larger than expected, and prices may be affected.

[1]**Germanium Oxide**—25 to 50 gm. lots, $6 per gm.

Iridium—£275@£300 per oz. for 98@99 per cent. Nominal. London, £80@£85 for 99.5 per cent.

[1]**Lithium**—95@96 per cent grade in 1 to 5 lb. lots, $65 per lb.

Magnesium—Ingot, 75@90c. per lb. in ton lots, depending on quality; best 99.85 per cent. Used as deoxidizer for nickel, nickel alloys, bronze and special non-ferrous alloys including aluminum. Demand gradually increasing.

London, 3s. 9d.@4s. 3d. for 99 per cent ingots or sticks.

[1]**Molybdenum**—99 per cent, $25 per kg.; C. P. metal, $80 per kg.

Monel Metal — Base price for shot, 32c. per lb.

Nickel—Ingot, 35c.; shot, 36c.; electrolytic, 39c. (99.75 per cent grade). Market good during February. London, £170@£175 per long ton, according to quantity.

Osmium—$90@$95 per oz.; London, £23 10s.@£25 10s.

Palladium—$78@$82 per oz. Crude, $60@$65 per oz. London, £17, nominal.

Platinum — Refined, $112 per oz. officially quoted. Sales also at $107@$110. Crude, $107@$108. The market is rather demoralized on account of reports of new fields and large potential production.

London, £23@£23½ per oz. for refined, and £21@£22 for crude. Demand limited.

Quicksilver—Per 75-lb. flask. $87.50 @$88. London, £15. San Francisco wires $89. Market is steady.

Radium—$70 per mg. radium content.

Rhodium—$80@$95 per oz.; London, £18@£22. Nominal.

Ruthenium—$85@$90 per oz.; London, £16½@£19½.

[1]**Selenium**—Black powdered, amorphous, 99.5 per cent pure, $1.95 per lb. in ton lots.

Tellurium—$2 per lb.

[1]**Thallium Metal**—Ingot, 99 per cent pure, $8 per lb. in 25-lb. lots.

Tungsten Powder—97 to 98 per cent pure, $1.18@$1.20 per pound.

[1]**Zirconium Metal**—98 per cent grade, per lb., $30, in 5 to 10 lb. lots.

Metallic Ores

Chrome Ore—Crude, 45 to 50 per cent Cr_2O_3, $20.50@$24 per net ton, f.o.b. shipping point. Price off $2.

New Caledonian, 52-54 per cent Cr_2O_3, $23; nominal.

Iron Ore—Lake Superior ores, per long ton, lower Lake ports:

Mesabi, non-bessemer, 51½ per cent iron, $4.25. Old Range, $4.40.

Mesabi, bessemer, 51½ per cent iron, $4.40. Old Range bessemer, 51½ per cent, $4.55.

High-phosphorus foundry, over 0.18 per cent P, $4.15.

Base prices have not been fixed for 1926 season, and many believe that market will not open for a month.

Eastern ores, cents per unit delivered at furnaces: Foundry and basic, 53 to 63 per cent, 9@10½c.

Foreign ores, f.o.b. cars Atlantic ports, cents per unit:

Swedish and Norwegian, low-phosphorus, 68 per cent, 11@11½c.

Spanish and Algerian, low-phosphorus, 52@54 per cent, 9½@10c.

Spanish foundry or basic, 50@54 per cent, 8½@9½c.

Swedish foundry or basic, 66@68 per cent, 9¼@10c.

Foreign ores, particularly Spanish, are a little firmer.

Manganese Ore—Per long ton unit of Mn, c.i.f. North Atlantic ports: Brazilian, 42c., nominal; Indian, 42c., nominal; Caucasian (unwashed), 40c.; Caucasian (washed), 42c.; market has been dull.

[1]Chemical grades, powdered, coarse or fine, 82@87 per cent MnO_2, Brazilian and Cuban, $70@$80 per ton in carloads.

Molybdenum Ore—55@65c. per lb. of MoS_2 for 85 per cent MoS_2 concentrates, f.o.b. mines. Largely nominal.

Tantalum Ore—Foreign, 50@75c. per lb. of Ta_2O_5 contained, c.i.f. New York.

Tungsten Ore—Per unit of WO_3, N.Y.: Wolframite, $11.50@$12.50; Western scheelite, $12.50@$13. Domestic demand very light, and prices largely nominal but firmly maintained. European demand fair. Curtailment in supplies from China anticipated.

Vanadium Ore—Minimum 18 per cent V_2O_5, $1 per lb. V_2O_5. Nominal.

Ore containing 4½ per cent V_2O_5 recently has sold at 25@35c., f.o.b. Montrose, Colo.

Non-Metallic Minerals

Prices received for non-metallic minerals vary widely and depend upon the physical and chemical characteristics of the commodity. Hence the following quotations can serve only as a general guide to the prices obtained by producers and dealers in different parts of the United States for their own product. In the last analysis the value of a particular non-metallic mineral can be ascertained only by direct negotiation between buyer and seller.

[1]**Amblygonite**—8@9 per cent lithium oxide, $50@$60 per ton, f.o.b. mines.

Andalusite—Sorted, $45@$50 per ton, f.o.b. *South Dakota* mines. Sales mostly for experimental lots.

Asbestos—F.o.b. *Quebec* mines, tax and bags included, per ton:

Crude No. 1, $525; crude No. 2, $300; spinning fibers, $190; magnesia and compressed sheet fibers, $125@$150; shingle stock, $70; paper stock, $40@$45; cement stock, $25; short fibers, $10@$17.50; floats, $15.

The market is good and prices are firm, being official prices quoted by the new consolidated company. Two producers who use their own output have agreed to turn any surplus over to sales agents of merger; two large producers have no agreements with merger.

No. 1 Rhodesian crude, $325; No. 2, $250 per ton, c.i.f. New York. Market excellent, with principal producer well sold ahead.

Barytes—F.o.b. mines, per ton, bags extra:

South Carolina: Crude, $7@$8 per gross ton; ground, off color, $14@$17 per short ton.

North Carolina: White bleached, $22 per short ton; white natural, $20.

Georgia: Barytes ore washed, $8. Good demand at current quotation.

Missouri: Water ground and floated, bleached, $23; $25 in less than car lots, f.o.b. works. Crude ore, $8@$8.50, f.o.b. mines.

Canada: 94@96 per cent $BaSO_4$, $9 per net ton, f.o.b. mine.

Bauxite — American, f.o.b. shipping point per gross ton: Crushed and dried, $5.50@$8.50; pulverized and dried, $14; calcined, crushed, $17@$20.

Foreign, per metric ton, c.i.f.: Dalmatian, low SiO_2, $5@$6.50; Istrian, $5.50@$7; French, red, $6@$7.50.

Prices are largely nominal, as contracts cover most of the 1926 deliveries.

Borax—Carload lots, in bags, per lb.: crystals, 5c.; granulated or powdered, 4¾c.; f.o.b. plant, *Illinois*.

[1]**Celestite**—90 per cent $SrSO_4$, finely powdered, $30 per ton in carload lots.

Chalk—Crude, in bulk, per ton c.i.f. New York, $4.75@$5.

China Clay (Kaolin)—F.o.b. *Virginia* mines, per ton: crude, lump, No. 1, $7; crude No. 2, $5.50; washed, $8; powdered and air-floated, $10@$20; ground, $7@$10.

[1]Price furnished by Foote Mineral Co., Philadelphia.

Georgia, washed lump, $8.65; *Florida*, washed lump. $13. Market slow.

1A grades, domestic, $16@$17, f.o.b. *Delaware* plants. Market slower.

Imported English, f.o.b. American ports: Lump, $11.50@$19; powdered, $45@$50. Demand fair.

Diatomite—Per short ton, f.o.b. plant, *California:*

Kiln-fired brick, $65; kiln-fired aggregate, ¼ in., $45; insulating powder, $30; natural aggregate, ¼ in., $20; air-floated powder, $40. "Calatom" (mill run), $14@$16.50 depending on quantity; market quiet on account of slack season in concrete pouring.

Emery — F.o.b. *Pennsylvania* and *New York* in 350-lb. kegs, per lb.: Greek Naxos, 6½c.; Turkish, 6½c.; Khasia, 5½c.; domestic, 4c. Market good.

Feldspar — F.o.b. mine or grinding plant:

North Carolina: No. 1 pottery grade, $6@$6.50 per long ton, depending upon quality. Market good.

New Hampshire: No. 1, not over 10 per cent SiO_2, $8.50 per short ton; pottery grade, $7.50. Ground, $17. Market fair.

New York: Per ton, f.o.b. cars, No. 1 crude, $8. Market good.

Maine: No. 1, ground, $19 per ton. Good demand.

Tennessee: No. 1 pottery, $16@$18 per ton for 140 and 200 mesh respectively. No. 1 enamel, 140 mesh, $14; 200 mesh, $16. Competition keen with some cutting of prices to get business, but demand good.

Maryland: 140 mesh, $18@$22; 120 mesh, $16; 60 to 100 mesh, $12@$15.

Canada, f.o.b. mine: High potash, $9, per ton, f.o.b. Quebec; crude, No. 1, over 12½ per cent potash, less than 5 per cent free SiO_2, $7.75@$8.50; crude, No. 2, 20 to 25 per cent free SiO_2, $6.25@$6.50.

Fluorspar—F.o.b. *Kentucky* and *Illinois* mines, per short ton:

Gravel, not less than 85 per cent CaF_2, and not over 5 per cent SiO_2, $17.50@$18. Foundry lump, 85-5, $20. Ground, 95 to 98 per cent CaF_2, and not over 2½ per cent SiO_2, $32.50. Acid lump, 98-1, $30 in car lots. Acid ground packed in bags, $40@$45. Fair tonnage sold; price of gravel spar firmer. Strong competition.

Canada: 84@86 per cent CaF_2, less than 5 per cent silica, $16.

New Mexico: 85-5 gravel, $15.75; 80-6 gravel, $15 f.o.b. mines. Ground, 96 per cent through 100 mesh, $35. Market stronger.

Fuller's Earth—Per ton, f.o.b. *Midway, Fla.:* 16 to 30 mesh, $16.50; 30 to 60 mesh, $18; 60 to 100 mesh, $15; 100 mesh "up," $8; 200 mesh "up," $15. Market somewhat stronger.

Powdered, imported, duty paid, $23@$25 per ton.

Garnet—Per ton f.o.b. mines:

Domestic, $85; *Canadian*, $70@$80.

Spanish grades, $60, c.i.f. port of entry.

Gilsonite—Per ton, carload lots, f.o.b. mines *Colorado:*

Jet asphaltum, $36; selects, $33; seconds (ordinary grades), $25.50; peerless black, $32.90. Market steady.

Graphite—F.o.b. New York, per lb.: Ceylon lump, 9@9½c.; chip, 7½@8c. dust, 3@5½c. Madagascar flake, 7½@8½c. Market fair.

Flake, 10@20c. according to grade; fine ground crystalline, 5@10c.; amorphous ground graphite, 6@8c. Crude amorphous graphite, $15@$35 per ton according to grade.

Prices firm; market steady and fairly strong.

Greensand—Per ton, f.o.b. cars, *New Jersey:* screened and bagged, best grade in carload lots, $30.

Gypsum—Per ton f.o.b. mill, depending upon location: Crushed, $2.50@$3; ground, $4@$6; agricultural, $6@$12; calcined, $7@$13.

[1]**Ilmenite**—Concentrates, 52 per cent TiO_2, 1½c. per lb., f.o.b. *Virginia* points. $60 per short ton, *Florida* mines.

Iron Oxide (See Ocher)—Standard Spanish red, 3@4c. per lb.; domestic earth, 2@4½c.

Kaolin—See China Clay.

[1]**Lepidolite**—$20@$30 per ton for ordinary grades. Nominal.

Limestone—F.o.b. shipping points, depending on location: crushed, ½ in. and less, 90c.@$2; 3 in. and larger, 90c. @$1.80 per ton.

Agricultural, $1.50@$5 for pulverized; 75c.@$2 for crushed, depending upon source, purity, and fineness.

Magnesite—Per short ton, f.o.b. *California* mines: Grade "A" calcined, 80 per cent through 200 mesh, $38@$42; dead burned, $35; crude, $14. Market fair, but improvement expected with spring building season.

Manjak—Barbados, in 10-ton lots, c.i.f. New York: grade "A," 6c. per lb.; grade "AA," fine, 8½c.

Mica—F.o.b. plant, per ton:

North Carolina: 20 mesh, roofing, $38; 100 mesh, white ground, $70. Market good.

New Hampshire: Mine run, $380, clean shop scrap, $25; mine scrap, $20. White, dry ground, 20 mesh, $35; 40 mesh, $45; 60 mesh, $60; 100 mesh, $75; 200 mesh, $85. Outlook good for 1926.

Madagascar, amber, dark, free from iron, per lb., f.o.b. *New York*, duty paid: special grade, $3@$3.25; No. A 1, $2.75; No. 1, $2.50; No. 2, $2.20; No. 3, $1.20; No. 4, 60@70c. No. 5, 42@45c. Grades depend on size of sheets.

[1]**Monazite**—Minimum 6 per cent ThO_2, $120 per ton.

Ocher—F.o.b. *Georgia* mines, per ton: $22.50@$25 in sacks; $25@$30 in barrels; washed and water floated, $25@$28; second grade, 99 per cent through 225 mesh, $19. Market good.

Phosphate—Per long ton, f.a.s. or f.o.b. mines:

Florida, pebble, f.a.s., for export: 76@77 per cent, $6.25; 75 per cent, $5.65; 74@75 per cent, $5.40; 70 per cent, $3.75; 68 per cent, $3.50. Market firm with good demand for the lower grades.

Florida, pebble, domestic: 76@77 per cent, $5.75; 75 per cent, $5; 74@75 per cent, $4.75; 70 per cent, $3.25; 76@78 per cent special, $6.25. Market better, with higher prices for low grades.

Tennessee, lump, ¾-in. screen, base 75 per cent, $6. Ground, 95 per cent through 200 mesh, base 65 per cent, $7.25; 70 per cent, $8.25. Market good.

Potash—	Bags	Bulk
Muriate of potash 80@85 per cent, basis 80 per cent	$34.90	$33.65
Sulphate of potash 90@95 per cent, basis 90 per cent	45.85	44.60
Sulphate of potash-magnesia 48@53 per cent, basis 48 per cent	26.35	25.10
Manure salt 30 per cent	20.00	18.00
Manure salt 20 per cent	13.35	11.35
Kainit 14@16 per cent	10.50	8.50
Kainit 12.4 per cent	10.00	8.00

Two thousand pounds net weight, c.i.f. Atlantic and Gulf ports. German weights, tares and analyses.

Discounts: 5 per cent on minimum of 50 tons K_2O; 6 per cent on 100 tons; 7 per cent on 300 tons; 10 per cent on 500 tons. Prices guaranteed against sellers' decline until April 30, 1926. Strong undertone to market.

Pumice Stone—In barrels, per lb., powdered, 3@5c.; selected lumps, 6@8c.; lumps in bags, 4@6c.

Pyrites—Tharsis, per long ton unit of sulphur, c.i.f. U. S. ports: furnace size, 13½c. Cinder from ore to remain property of buyers. Market stronger, with good inquiry.

[1]**Quartz Rock Crystals**—Colorless, clear and flawed, pieces ¼ to ½ lb. in weight, 40c. per lb. in ton lots. For optical purposes, double above prices.

Rutile—*Virginia*, per lb.; granular, 94@96 per cent TiO_2, 12@15c.; pulverized, 100 mesh, 94@96 per cent, 17@30c.

Florida 93 per cent TiO_2, $200 per ton.

Silica—Water ground and floated, per ton in bags f.o.b. *Illinois:* 450 mesh, $31; 350 mesh, $26; 250 mesh, $22.

Glass sand, f.o.b. producing plant, $1.25@$5 per ton; brick and molding sand, 40c.@$2; blast sand, $2@$4.50.

[1]**Spodumene**—$20@$30 per ton, depending upon lithium content. Nominal.

Sulphur—$16 per ton for domestic, f.o.b. *Texas* mines; $20 for export, f.a.s. *New York*. Good shipment against contracts. Open prices $1 higher.

Talc—Per ton, carload lots, f.o.b. works, containers included:

Vermont: 99 per cent through 200 mesh, extra white, $11@$12; 96 per cent through 200 mesh, medium white, $10@$11; packed in 50-lb. paper bags. Demand slack, but prices steady.

New York: Double air-floated, 100 mesh, $11.25; 200 mesh, $13.75; 325 mesh, $14.75. Demand fair.

Georgia: Powdered, gray, $7.50@$10; yellow, $9@$12; red, $11@$13; roofing, $7.50@$9. Market fair.

New Jersey: Soapstone, ground, $9.25@$10.25; market fair; prices lower.

Tripoli—Per short ton, burlap bags, paper liners, minimum carload 30 tons, f.o.b. *Missouri*: Once ground through 40 mesh: rose and cream colored, $16. Double ground through 110 mesh: rose and cream, $17. Air-floated through 200 mesh: rose and cream, $25; mill run, $15. Active business at lower prices.

[1]Price furnished by Foote Mineral Co., Philadelphia.

[1]**Zircon**—Freight allowed east of Mississippi River: 95 per cent, 3c. per lb., f.o.b. mines, in carload lots.

Mineral Products

Arsenious Oxide (white arsenic)—3@3½c. per lb. Several cars sold. London £14@£15 per long ton.

Copper Sulphate—Large crystals, 4.45@4.75c. per lb.; small, 0.1c. less.

Sodium Nitrate—Spot, crude $2.71@$2.74 per 100 lb., ex vessel Atlantic ports. March, April, and May command small premium.

Sodium Sulphate—$1.10@$1.20 per 100 lb., f.o.b. works, for Glauber's salt.

Zinc Oxide—Per lb. in bags: Lead-free, 7½c.; 35 per cent leaded grades, 8c.; French, in car lots, 10½c.

Ferro-Alloys

[1]**Ferrocerium**—$7 per lb.

Ferrochrome—1@2 per cent carbon, 23@25c. per lb. of contained chromium; 4 to 6 per cent carbon, 11½c. per lb; 0.1 per cent, 35c. per pound.

Ferromanganese—Domestic and foreign, 78@82 per cent, $115 per gross ton. Spiegeleisen, 19@21 per cent, $33@$34 f.o.b. furnace; 16@19 per cent, $32.

Ferrophosphorus—Electrolytic, 18 per cent P, $91 per ton; 24 per cent, $122.50; f.o.b. Ala. and Tenn.

Ferrosilicon—14 to 16 per cent, $42 @$47 per gross ton, f.o.b. works; 50 per cent, $85 delivered in carload lots; 75 per cent, $145. Market active.

Ferrotitanium—For 15 to 18 per cent material, $200 per ton, f.o.b. Niagara Falls, N. Y.

Ferrotungsten—$1.14@$1.17 per lb. of contained W, f.o.b. works, according to grade.

[1]**Ferro-uranium**—30 to 40 per cent U, $4.50 per lb. of U contained, f.o.b. works in 500-lb. lots.

Ferrovanadium—Per lb. of V contained, f.o.b. works, $3.40@$4, depending on grade.

Metal Products

Rolled Copper—Sheets, 22¾c.; wire, 16c.

Lead Sheets—Rolled, 13c.; clipped, 13¼c.

Nickel Silver—29¾c. per lb. for 18 per cent nickel Grade A sheets.

Yellow (Muntz) Metal—Dimension sheets, 20½c. per lb.; rods, 17½c. per lb.

Zinc Sheets—12c. per lb., f.o.b. works.

Refractories

Chrome Brick—$45@$48 per net ton, f.o.b. shipping point.

Firebrick—First quality, $43@$46 per M., Ohio, Kentucky, Central Pennsylvania; second quality, $35@$40.

Magnesite Brick—9-in. straights, $65 per net ton, f.o.b. works.

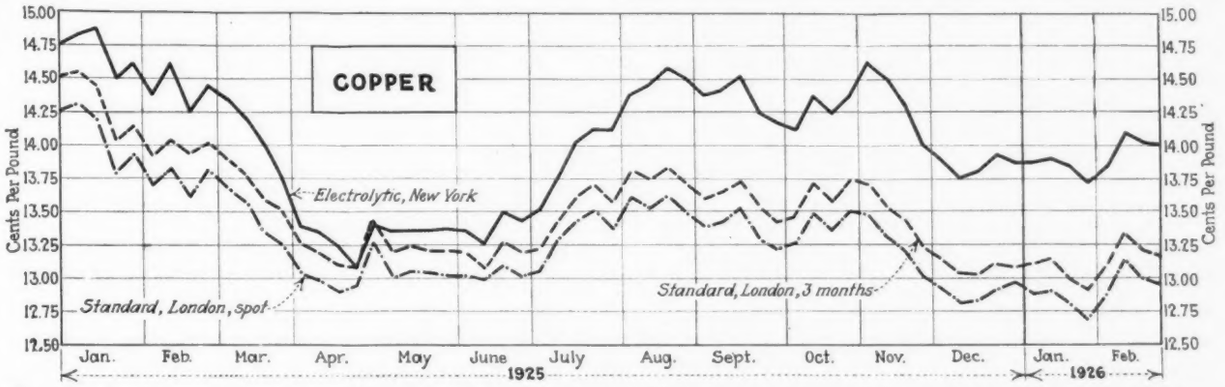
Silica Brick—$40 per M. Pennsylvania and Ohio; $48@$52 Alabama.

[1]**Zirkite**—Powdered, 80 per cent ZrO_2, 2½c. per lb. Brick, straights, 80c.@$1 each.

Proposed Copper Export Association Awakens Interest In London Metal Circles

By Arthur B. Parsons
Assistant Editor

THAT metal dealers and consumers in London, and in fact in all Europe, are deeply interested in the prospective formation of a strong Copper Export Association in the United States, working in close accord with the Union Minière and possibly other foreign producers, goes without saying. The tentative program is understood to provide participation by producers of about 90 per cent of North and South American copper. If to this be added the Belgian Union Minière, with its immense output from Katanga, and Rio Tinto, which is mentioned in reports from London, nearly 90 per cent of the world's output would be represented.



Trend of copper prices, showing the relation between New York electrolytic and "Standard" in London

The only authorized statement from New York, to date, is the announcement made early in February to the effect that "preliminary conferences in which most of the copper producers interested in foreign markets have participated have resulted in the drafting of a plan for the formation of an export association under the provisions of the Webb-Pomerene law." It is added that the drafts have been submitted to counsel of the respective companies for study. Further than this it is understood that conferences have been held with officials in Washington. Whether matters have progressed to this stage or not, it is certain that no definite step will be taken by producers in the United States without the entire approval of the federal authorities. They intend to lay their cards on the table and satisfy the Department of Justice and the Federal Trade Commission that their activities will not "restrain trade" unlawfully in the domestic market. Moreover, when M. Jadot, chairman of Union Minière, recently announced an entente with certain American copper producers, he stated specifically that all parties were to be entirely free as to their rate of production. The agreement merely provided that copper is to be sold to consumers only, thereby eliminating from the picture, as far as possible, dealers and speculators.

In the face of these facts the *Financial Times* of London apparently shot wide of the mark when it said recently in a special leading article, "According to persistent rumors, both here and in New York, there is a movement on foot among the world's leading copper producers for a friendly agreement governing *production* [italics mine] and sales, something along the same lines as have been so successfully followed by the Diamond Syndicate."

The significant word is "production." No keen perception is needed to foresee that any step toward concerted curtailment of production in America would instantly precipitate trouble with the Washington government. It is true that producers in the Tri-State zinc district feel free to co-operate in the regulation of production; but the members of their association all operate in Oklahoma—in spite of the trinity suggested in the name of the district—and they sell their "jack" outright at the mine. As there is no interstate commerce the producers are immune from federal regulation; but the situation is, of course, entirely different with the copper producers. In view of these circumstances, and of the further fact that the established policy of the Union Minière is to increase its rate of output as rapidly as possible, for several years at least, it seems safe to conclude that whatever group control is exercised by the Copper Export Association and its foreign collaborators will have to do with sales and not with production.

As to just what will be the effect of a unified selling policy in European markets no one can foretell with any assurance. In fact, the doctors disagree. Doubtless, the members of the association hope to realize a little more on the average for their copper than they would if the present régime were continued; that would be the strongest incentive to organize. The United States consumed about 51 per cent and the rest of the world 49 per cent of the copper used during 1925. Obviously, then, it would be well worth while to increase the price of foreign copper even if there were no effect whatever on the average domestic price. It is argued, not without some logic, that the important consumers in the United States would be willing to pay a little more for copper if the market could be rid of wide fluctuations. It is contended that economies resulting from a stabilized market would offset a slightly higher average price.

Stabilization First Aim

In any event the first objective of the copper producers unquestionably is stabilization both in the United States and abroad; and they agree generally that stabilization of the London market is the first step toward that end.

This view seems to find substantiation in the accompanying graph. The curves show the refinery price of electrolytic copper in New York on each Wednesday since Jan. 1, 1925, and the corresponding quotations for spot and "three-months" Standard copper on the London Metal Exchange, converted to cents per pound so as to eliminate the influence of fluctuations in sterling exchange. Some sellers in the United States contend that the Standard market in London should not have any influence on the New York market for electrolytic. But remembering that the London figures are cabled to the United States each day before business is under way, the almost invariable way in which New York follows London is convincing evidence that the price of Standard has a marked influence on the domestic electrolytic price, whether it ought to or not.

Standard copper is not essentially a manufacturing commodity like electrolytic. The existing stocks in official British warehouses comprise about 55,000 tons of impure metal that, as it stands, has no important industrial use because of the impurities that it contains. Warrants for this metal, however, serve as a medium for trade on the London Metal Exchange, the distinctive feature being that London Standard is the only form in which copper can be bought and sold in a broad open market for future as well as spot delivery. For this reason it is a medium for specu-

Metal Statistics

Monthly Average Prices of Metals

Silver

	New York		London		Sterling Exchange	
	1925	1926	1925	1926	1925	1926
January	68.447	67.795	32.197	31.308	477.702	485.295
February	68.472	66.773	32.245	30.797	476.886	485.852
March	67.808	.....	31.935	.....	477.279	.....
April	66.899	.....	31.372	.....	479.034	.....
May	67.580	.....	31.276	.....	484.960	.....
June	69.106	.....	31.863	.....	485.553	.....
July	69.442	.....	31.954	.....	485.514	.....
August	70.240	.....	32.268	.....	485.264	.....
September	71.570	.....	32.983	.....	484.270	.....
October	71.106	.....	32.972	.....	483.909	.....
November	69.223	.....	32.155	.....	484.201	.....
December	68.889	.....	31.835	.....	484.538	.....
Year	69.065	.....	32.088	.....	482.426	.....

New York quotations cents per ounce troy, 999 fine, foreign silver. London pence per ounce, sterling silver, 925 fine.

Copper

	New York		London			
	Electrolytic		Standard		Electrolytic	
	1925	1926	1925	1926	1925	1926
January	14.709	13.822	66.065	59.013	70.607	65.325
February	14.463	13.999	64.714	59.669	69.525	66.375
March	14.004	.....	62.892	.....	67.739	.....
April	13.252	.....	60.575	.....	64.194	.....
May	13.347	.....	60.131	.....	63.560	.....
June	13.399	.....	59.899	.....	63.369	.....
July	13.946	.....	61.467	.....	65.750	.....
August	14.490	.....	61.613	.....	68.169	.....
September	14.376	.....	61.886	.....	67.693	.....
October	14.300	.....	61.977	.....	67.523	.....
November	14.353	.....	61.280	.....	67.893	.....
December	13.866	.....	59.540	.....	65.625	.....
Year	14.042	.....	61.920	.....	66.804	.....

New York quotations, cents per pound. London, pounds sterling per long ton.

Lead

	New York		St. Louis		London		
	1925	1926	1925	1926	1925	1926	1926 3 M
January	10.169	9.255	9.953	9.102	41.443	34.778	34.584
February	9.428	9.154	9.126	8.991	37.944	33.903	33.903
March	8.914	.....	8.578	.....	36.804	.....	.....
April	8.005	.....	7.662	.....	32.791	.....	.....
May	7.985	.....	7.780	.....	32.283	.....	.....
June	8.321	.....	8.024	.....	33.479	.....	.....
July	8.151	.....	8.054	.....	34.698	.....	.....
August	9.192	.....	9.284	.....	38.188	.....	.....
September	9.508	.....	9.303	.....	38.884	.....	.....
October	9.513	.....	9.299	.....	39.017	.....	.....
November	9.739	.....	9.578	.....	36.872	.....	.....
December	9.310	.....	9.157	.....	34.739	.....	.....
Year	9.020	.....	8.817	.....	36.429	.....	.....

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Tin

	New York				London	
	99%		Straits			
	1925	1926	1925	1926	1925	1926
January	57.692	61.415	58.250	2.275	265.560	282.038
February	56.517	62.653	57.068	63.705	262.181	287.107
March	53.038	.....	53.733	.....	245.682	.....
April	51.380	.....	52.135	.....	237.006	.....
May	53.675	.....	54.620	.....	245.476	.....
June	54.885	.....	55.957	.....	252.476	.....
July	56.683	.....	58.014	.....	258.435	.....
August	56.649	.....	58.190	.....	258.538	.....
September	56.405	.....	58.247	.....	259.182	.....
October	60.462	.....	62.274	.....	277.722	.....
November	62.136	.....	63.304	.....	284.506	.....
December	61.952	.....	62.928	.....	284.920	.....
Year	56.790	.....	57.893	.....	260.974	.....

New York quotations, cents per pound. London, pounds sterling per long ton.

Zinc

	St. Louis		London	
			1925	1926
	1925	1926	Spot	3 M
January	7.738	8.304	37.917	38.059	37.363
February	7.480	7.759	36.528	36.053	35.956
March	7.319	.....	35.741	.....	.....
April	6.985	.....	34.644	.....	.....
May	6.951	.....	34.223	.....	.....
June	6.990	.....	34.149	.....	.....
July	7.206	.....	34.894	.....	.....
August	7.576	.....	36.691	.....	.....
September	7.753	.....	37.435	.....	.....
October	8.282	.....	39.884	.....	.....
November	8.614	.....	39.039	.....	.....
December	8.565	.....	38.327	.....	.....
Year	7.622	.....	36.624	.....	.....

St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Antimony, Quicksilver and Platinum

	Antimony (a) New York		Quicksilver (b) New York		Platinum (c) Refined New York		Platinum (c) Crude New York
	1925	1926	1925	1926	1925	1926	1926
January	17.428	23.490	81.596	87.960	117.000	118.20	113.20
February	19.795	21.676	79.386	87.580	117.000	113.909	108.341
March	15.553	.....	80.481	.....	117.000	.....	.....
April	12.553	.....	82.327	.....	118.269	.....	.....
May	15.770	.....	81.360	.....	119.850	.....	.....
June	16.500	.....	83.154	.....	120.000	.....	.....
July	17.779	.....	83.077	.....	120.000	.....	.....
August	17.683	.....	82.317	.....	120.000	.....	.....
September	17.143	.....	81.730	.....	120.000	.....	.....
October	18.029	.....	83.856	.....	120.000	.....	.....
November	20.000	.....	88.250	.....	120.000	.....	.....
December	21.692	.....	90.000	.....	120.000	.....	.....
Year	17.494	.....	83.128	.....	119.093	.....	.....

(a) Antimony quotations in cents per pound for ordinary brands. (b) Quicksilver in dollars per flask. (c) Platinum in dollars per ounce.

Pig Iron, Pittsburgh

	Bessemer		Basic		No. 2 Foundry	
	1925	1926	1925	1926	1925	1926
January	24.66	22.76	23.76	21.76	23.76	22.26
February	24.50	22.76	23.26	21.76	23.76	22.26
March	24.06	.....	23.06	.....	22.91	.....
April	22.89	.....	21.76	.....	22.26	.....
May	21.57	.....	20.26	.....	21.16	.....
June	20.76	.....	19.76	.....	20.11	.....
July	20.76	.....	19.76	.....	20.26	.....
August	20.76	.....	19.76	.....	20.26	.....
September	21.04	.....	20.03	.....	20.50	.....
October	21.50	.....	20.37	.....	20.83	.....
November	22.64	.....	21.58	.....	22.08	.....
December	22.76	.....	21.76	.....	22.26	.....
Year	22.33	.....	21.26	.....	21.68	.....

In dollars per long ton.

Monthly Crude Copper Output in Short Tons

Domestic

	1925 Aug.	Sept.	Oct.	Nov.	Dec.	1926 Jan.
Alaska shipments	67	5,496	3,140	4,677	2,880	3,644
Calumet & Arizona	1,970	1,840	2,117	2,070	1,682	1,737
Miami	2,350	2,088	2,052	2,090	2,112	2,228
New Cornelia	2,460	2,806	2,734	2,150	3,604	3,664
Nevada Con.	....	9,142†	....	....	9,777†	....
Old Dominion	1,030	1,370	1,097	958	1,217	1,291
Phelps Dodge	6,600	6,748	6,636	6,500	6,957	7,586
Ray, Con.	....	17,541†	....	....	18,025†	....
United Verde Extension	1,928	1,865	1,797	1,632	1,874	1,987
Utah Copper	....	26,798†	....	....	26,723†	....
Tennessee Copper	610	585	596	573	604	555

Foreign

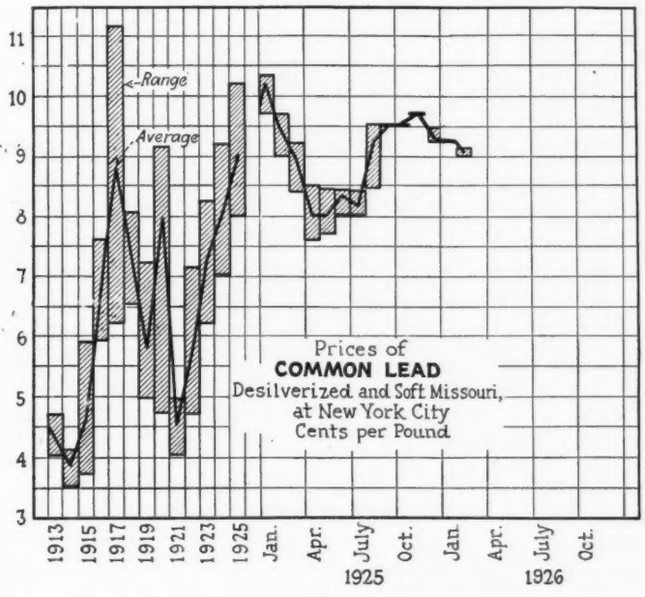
Boleo, Mexico	832	858	854	798	773	771
Furukawa, Japan	1,409	1,575	1,613	1,349	1,579	....
Granby Cons., Canada	1,669	1,495	1,738	1,396	1,927	....
Katanga, Africa	10,165	8,284	8,703	8,207	6,703	6,827
Mount Morgan, Aust.	272	....	....	....	....	....
Mount Lyell, Aust.	....	2,076†	....	....	....	....
Phelps Dodge, Mexican	2,118	1,963	1,822	2,224	2,154	1,376
Sumitomo, Japan	1,691	1,011	1,742	1,553	1,683	....

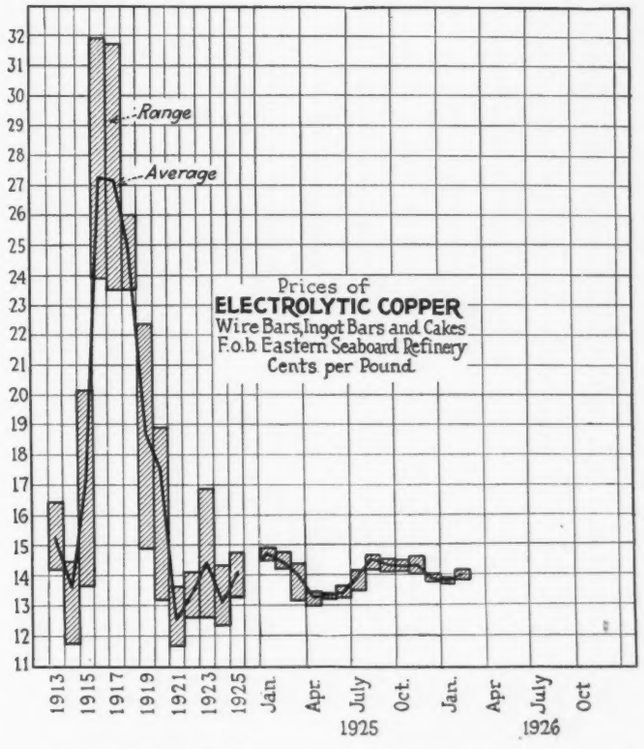
†Three months.

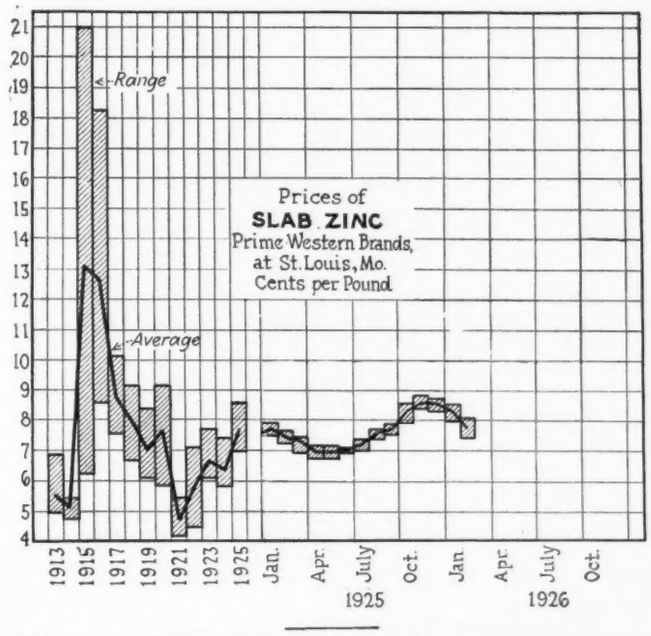
Monthly Production of Primary Copper from U. S. Mines and Daily Rate (Short Tons)

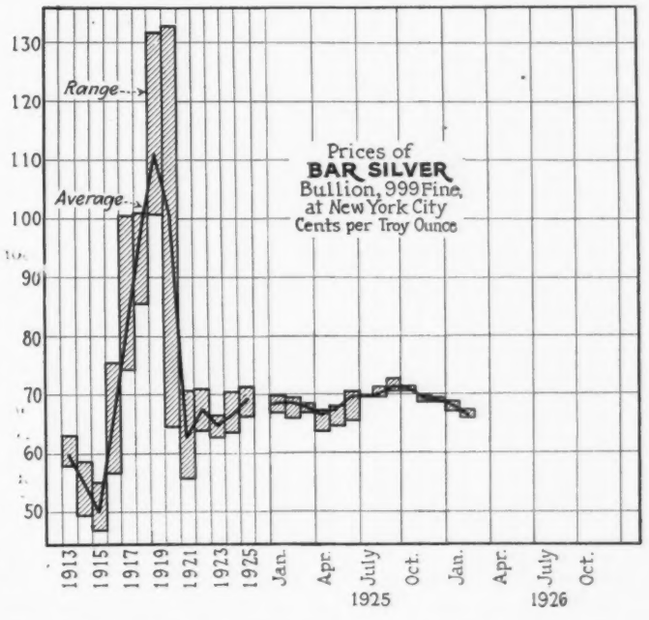
	1924 Monthly Production	Daily Rate	1925 Monthly Production	Daily Rate	1926 Monthly Production	Daily Rate
January	66,631	2,149	74,789	2,412	71,314	2,300
February	65,681	2,265	68,967	2,463	.....	.....
March	65,181	2,102	74,901	2,416	.....	.....
April	66,073	2,202	70,667	2,356	.....	.....
May	65,608	2,116	70,574	2,276	.....	.....
June	63,933	2,131	59,894	2,330	.....	.....
July	64,787	2,090	68,507	2,210	.....	.....
August	66,756	2,153	68,090	2,196	.....	.....
September	63,800	2,127	67,720	2,272	.....	.....
October	68,989	2,225	71,042	2,292	.....	.....
November	68,291	2,276	67,400	2,247	.....	.....
December	67,647	2,182	69,566	2,244	.....	.....
Total	793,377	.....	842,117	.....	71,314	.....
Monthly average	66,115	.....	70,176	.....	.....	.....
Average of daily rate	.....	2,168	.....	2,307	.....	2,300

Metal Price Curves

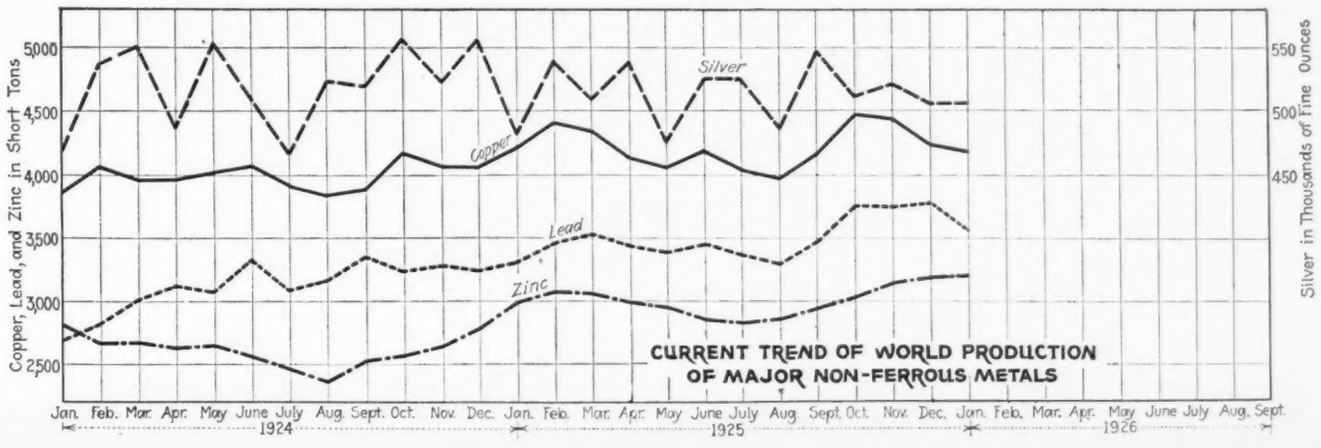



Range
Average
Prices of
ELECTROLYTIC COPPER
Wire Bars, Ingot Bars and Cakes
F.o.b. Eastern Seaboard Refinery
Cents per Pound
1913 1915 1917 1919 1921 1923 1925 Jan. Apr. July Oct. Jan. Apr. July Oct
1925 1926





THE curves below are not to be considered as permanent records of production. They show merely the current trend in terms of daily output, according to latest estimates of the American Bureau of Metal Statistics. The figures represent countries that produced in 1923 and 1924 about 97 per cent of the world's output of copper; 78.5 per cent of the lead; 87.5 per cent of the zinc; and 81 per cent of the silver.


Silver
Copper
Lead
Zinc
Copper, Lead, and Zinc in Short Tons
Silver in Thousands of Fine Ounces
CURRENT TREND OF WORLD PRODUCTION
OF MAJOR NON-FERROUS METALS
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept.
1924 1925 1926

lative trading by dealers, and for hedging operations by consumers who are able to sell forward Standard metal to protect themselves against declines in the price of electrolytic.

In the accompanying graph it will be seen that Standard is uniformly below parity for electrolytic. In general there are fairly definite limits between which the spread must remain. Electrolytic is good delivery against Standard contracts; moreover, it commands a premium. Consequently, if the price of Standard approximated that of electrolytic it would be profitable to buy electrolytic for delivery against Standard contracts. On the other hand, if Standard fell far enough below electrolytic it would be profitable to buy it and ship it to the United States for refining. Allowing for ocean freight, insurance, interest, and the cost of refining, the minimum spread would have to be in the neighborhood of 1.5c. per pound, which is considerably greater than appears at any period shown on the graph. Most of the Standard metal now on hand contains impurities that are particularly indigestible in electrolytic cells and only small proportions can safely be added to the regular intake of a refinery. In this connection the following quotation from the article in the *Financial Times* is interesting:

"Whatever may be behind the current rumors there is no doubt that America has recently been buying Standard copper warrants in this country with a view to shipping the metal to the other side. . . . The stock here is estimated at 50,000 tons, and if the Americans bought anything from 15,000 to 25,000 tons for refining in the States our supplies would become abnormally short. The price would be likely to rise rapidly. It is significant that the recent demand has been more particularly for warrants lying in Liverpool warehouses."

In some quarters on both sides of the Atlantic it is believed that the producers would like to eliminate the Standard market as an important factor in the copper business in the belief that it is at the bottom of many of their difficulties. London metal dealers say that any attempt in this direction would prove fruitless, but their judgment is doubtless influenced by their personal interests.

The view of some of the American producers is that if the European market could be stabilized to a reasonable degree—and they do not use stabilizing as synonymous to increasing the price level—pure speculation would not be attractive and shrewd traders would turn to some other commodity for their operations. This would still leave the legitimate consumer the opportunity to cover his spot purchases. It has likewise been suggested that with some assurance of a steady market the need for hedging operations would be minimized.

Sight should not be lost of the fact that the Standard market is a two-edged sword. It has doubtless started declines, but it also has arrested them. Referring to the curves it will be seen that all the markets were headed precipitately downward in March and early April. London was the first to stem the tide. Over there when copper is considered cheap there usually are buyers, a natural concomitant of a speculative market. Another fact emphasized by the curve is the fairly uniform margin in favor of 3 months as compared with spot Standard. Normally this would be equivalent to the warehouse and interest charges, but it also doubtless reflects the prevalent feeling that copper is really selling too cheaply.

This much is certain: During the last year, more perhaps than ever before, domestic buyers of copper—and incidentally of lead and zinc, too—have been paying a great deal of attention to the London cables each day in formulating their purchasing policies. If a few hundred tons of Standard has changed hands between speculators in London at 10s. under the previous day's price the influence—call it sentimental if you will—has been bad on the domestic market. It has been out of proportion to the influence of such factors as the statistical position, and the general industrial situation in the United States. It is easy to see why the producers are dissatisfied.

In the long run the price of copper, as always, will be governed by the balance between supply and demand. Leaving artificial and organized curtailment of production out of consideration, the domestic user has no cause for apprehension. A unified selling policy abroad, however, in accord with the provisions of the Webb-Pomerene act, seems to promise some benefit to the American and Belgian producers.

Slight Increase in Mining Dividends in February

The following dividends were paid by American mining and metallurgical companies in February, 1926:

Dividends Paid

Companies in the United States	Situation	Per Share	Total
American Smelting & Refining....	Various	$1.75 Q	$1,067,465
Anaconda Copper Mining.....	Various	0.75 Q	2,250,000
Betty O'Neal Mines, s.....	Nev.	0.05 M	22,047
Chief Consolidated, l, s.....	Utah	0.10 Q	113,870
Colorado Fuel & Iron pfd.....	Various	2.00 Q	40,000
General Development.....	Various	0.25 Q	30,000
Gladstone Mountain, l.....	Wash.	0.005 M	6,609
Homestake Mining, g.....	S. D.	0.50 M	125,580
International Nickel, pfd., n,.c...	Ont., W. Va.	1.50 Q	133,689
Keystone Mining, l, s.....	Utah	0.075 SA	67,500
Miami Copper.....	Ariz.	0.25 Q	186,778
New Cornelia Copper.....	Ariz.	0.30 Q	546,000
New Jersey Zinc.....	Various	2.00 Q	981,632
U. S. Steel pfd.....	Various	1.75 Q	6,304,919
United Verde Extension, c.....	Ariz.	0.75 Q	787,500
Vanadium Corporation.....	Colo., Peru	0.50 Q	189,184
Companies in Other Countries			
Amparo Mining, g, s.....	Jalisco	$0.02 Q	$40,000
Aramayo Mines in Bolivia,s,t,b,c,	Bolivia	Sw. fr. 1.25	1,050,000
Cerro de Pasco, c, s.....	Peru	1.00 Q	1,122,842
Hollinger Consolidated Gold.....	Ont.	0.08 4 wks.	393,600
Teck-Hughes Gold Mines.....	Ont.	0.05 I	250,000
Total.....			$14,653,215

s, silver; l, lead; g, gold; n, nickel; c, copper; t, tin; b, bismuth; Q, quarterly M, monthly; SA, semi-annually; I, initial.

The total mining dividends paid in February amounted to about $400,000 more than in the corresponding last quarter, paid in November, though the total was slightly less than a year ago owing to the fact that Davis-Daly paid a liquidation dividend in February, 1925. Betty O'Neal has paid 7½c. per share the last few months, a disbursement that has not been included in previous monthly lists. Keystone Mining paid the same dividend as was paid last August. New Cornelia increased its dividend from 25 to 30c. New Jersey Zinc paid the usual dividend of $2, the report that it paid 90c., published in some financial papers, being an error. Teck-Hughes paid its initial dividend, following increased development of the mine and enlargement of the mill; it is reported to be the present idea of the directors of the company to make the 5c. dividend a semi-annual rather than a quarterly disbursement.

Dividend Yields

The dividend yields on the stocks of the above companies, based on the February distributions and market prices at the end of the month, are as follows:

Company	Per Cent Yield	Company	Per Cent Yield
Keystone.....	30.0	Cerro de Pasco	6.3
Gladstone.....	16.2	New Cornelia	6.0
Homestake.....	11.9	Int. Nick. pfd.	5.9
Chief. Con.....	11.4	U. S. Steel pfd.	5.6
United Verde Ex.....	10.3	Hollinger	5.5
Miami.....	8.3	A. S. & R.	5.3
Colo. Fuel pfd.....	7.5	N. J. Zinc	4.0
Vanadium.....	6.4	Teck-Hughes	2.9
Anaconda.....	6.4		

Gold Output of Transvaal Up in January, 1926

The output of gold of the mines of the Transvaal during January, 1926, amounted to 796,270 oz. of fine gold, as compared with 791,455 oz. in December, 1925. In January, 1925, the output amounted to 823,692 oz. of fine gold. The following table shows the monthly output for the last seven years:

Transvaal Gold Output, 1921-1926

In Fine Ounces

	1921	1922	1923	1924	1925	1926
January.....	651,593		764,469	796,768	823,692	796,270
February.....	558,137	639,728	704,970	760,617	753,925	.....
March.....	671,123		761,586	795,671	825,479	.....
April.....	681,382	511,338	743,651	768,923	787,519	.....
May.....	687,776	629,786	786,564	809,003	813,249	.....
June.....	678,490	675,697	755,309	773,053	780,251	.....
July.....	689,555	730,635	754,306	829,437	818,202	.....
August.....	711,526	752,490	769,371	809,571	808,218	.....
September.....	691,026	747,089	739,504	799,422	797,247	.....
October.....	707,825	778,159	793,842	827,583	812,832	.....
November.....	704,236	764,476	780,639	802,313	787,633	.....
December.....	681,847	790,712	778,849	825,273	791,455	.....
Totals.....	8,114,516	7,020,110	9,133,060	9,597,634	9,599,702	796,270